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The Iron Age

E NATIONAL METALWORKING WEEKLY

January 21, 1954

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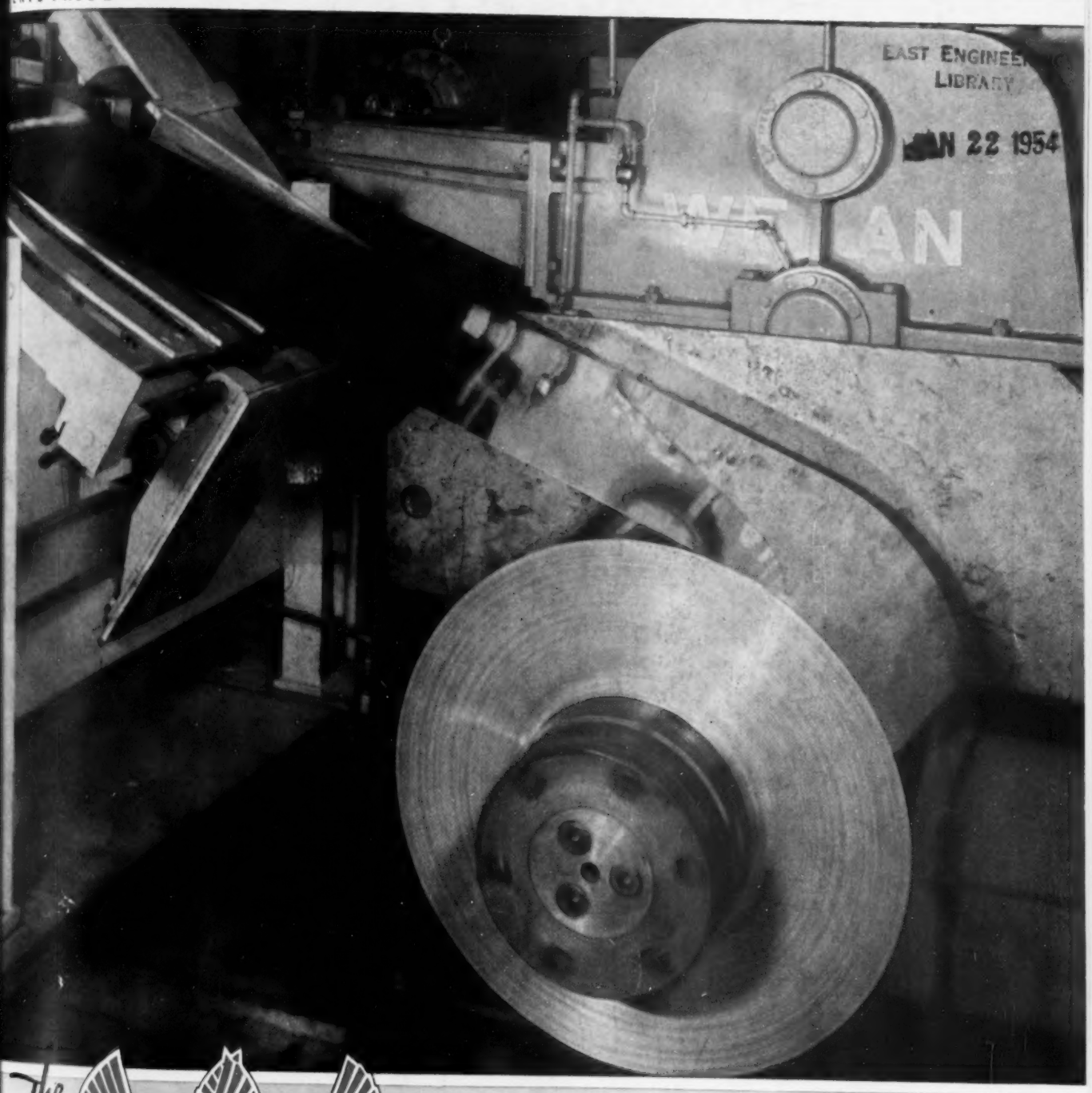
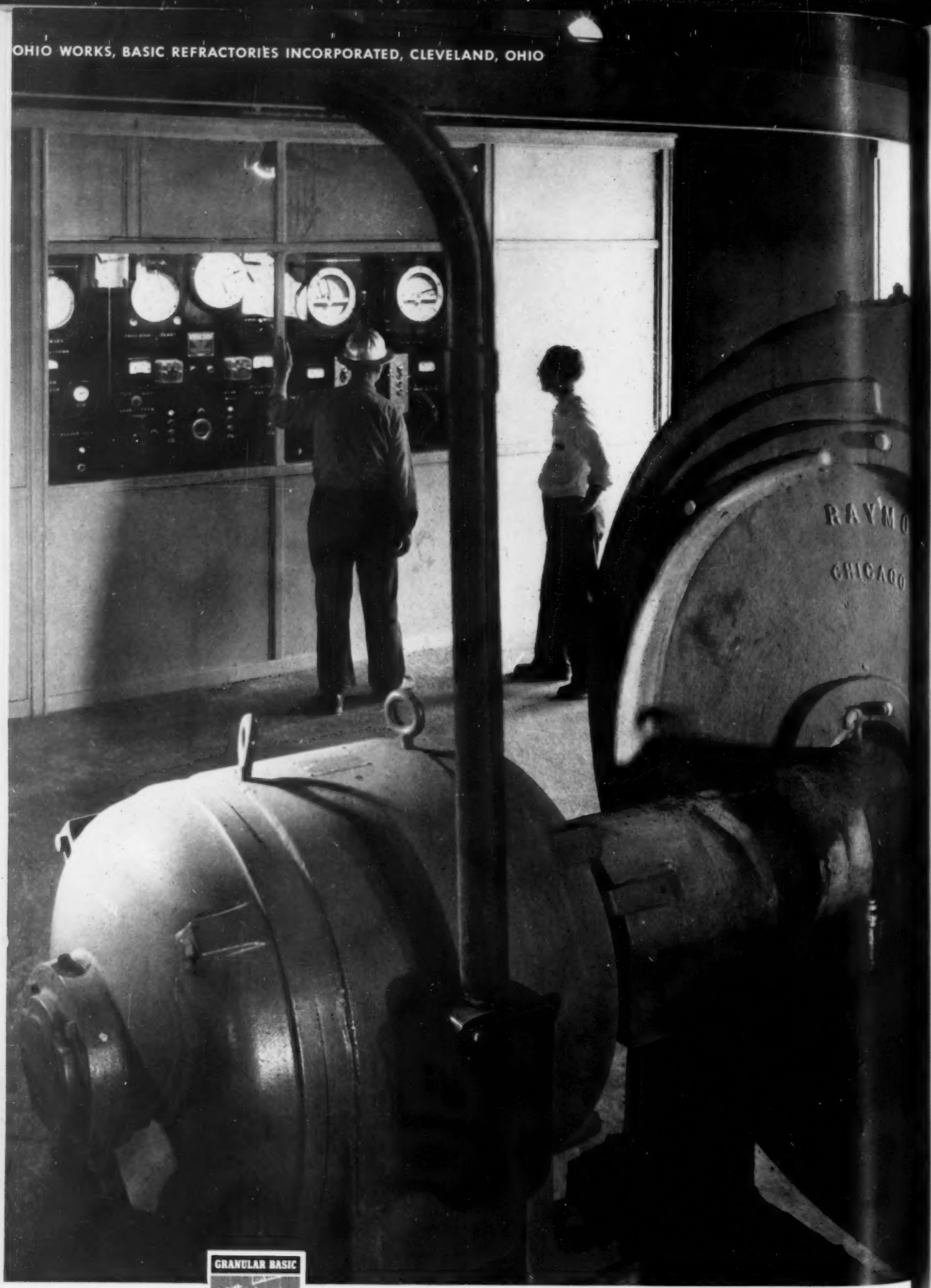


The VEAN ENGINEERING COMPANY, Inc.
WARREN OHIO



GRANULAR BASIC

REFRACTORIES

"A good workman is known by his tools"

What is an Alloy Steel?

This is the first of a series dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

Here is an easy definition to remember: An alloy steel is a steel in which one or more alloying elements have been blended to give it special properties that cannot be obtained in carbon steel.

Or, here is the metallurgical definition: An alloy steel is one in which the maximum specified content of alloying elements exceeds one or more of the following limits—

Manganese, 1.65 pct; Silicon, 0.60 pct; Copper, 0.60 pct

or in which a definite range or a definite minimum quantity of any of the following elements is specified or required within the limits of the recognized commercial field of alloy steels: aluminum, boron, chromium up to 3.99 pct, cobalt, columbium, molybdenum, nickel, titanium, tungsten, vanadium, zirconium, or any other element added to obtain a desired alloying effect.

As a rule, alloy steel is more difficult to make than carbon steel. There are more elements to be kept within specified ranges and, in general, the ranges of the alloying elements are comparatively narrow; hence the mathematical chances for producing off-heats are correspondingly increased. Moreover, most alloy steels require special reheating and cooling to prevent such imperfections as flaking and cracking.

Surface imperfections must be removed from the billets by scarfing, chipping, or grinding. More exacting methods of testing and inspection are necessary to insure uniformity.

WHERE DOES IT PAY TO USE ALLOY STEELS?

Generally speaking, it is advisable to use alloy steel when more strength, ductility, and toughness are required than can be obtained in carbon steel in the section under consideration. Alloy grades should also be used where specific properties such as corrosion-resistance, heat-resistance, and special low-temperature impact values are needed.

In some cases it requires considerable study to determine when and how to use a particular alloy steel to advantage in a product. Where there is any problem or doubt concerning its use, Bethlehem metallurgists will gladly give impartial advice on analysis, heat-treatment, machinability, and expected results.

In addition to manufacturing all AISI standard alloy steels, this company produces other than standard analysis steels and the full range of carbon grades.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

The Iron Age

Vol. 173, No. 3, January 21, 1954

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DIGEST of

NEWS DEVELOPMENTS

BUSINESS PLANES SAVE TIME, EARN MONEY — P. 35
Company ownership of multi-engine executive type airplanes has shot from less than 50 at the close of World War II to over 1200 today. Reason is simple: It pays business to own their own planes. Speed, comfort, convenience are the major advantages. List details of prices, operating expenses.

STEEL INTEREST IN PLASTIC PIPE GROWS — P. 38
Producers of steel pipe have been among the first to see the advantages of plastic pipe—in some applications it can beat the pants off steel. Two major steel firms are now getting their feet wet in the plastic business. A third has been producing plastic pipe experimentally. Others are investigating.

PUT IT ON THE CUFF WITH CREDIT CARDS — P. 39
Charge craze has resulted in formation on many credit card clubs which enable businessmen to charge everything from dinner to a car wash. Charge system is convenient, gives businessmen permanent record of entertainment expenses for tax purposes. Helps keep expense accounts honest. What some credit clubs offer.

HOT EXTRUSION SIRES NEW FAMILY OF USES—P. 43
Hot extrusion of steel and other metals by the Ugine-Sejournet process may lead to a whole family of hot working operations based on the use of molten glass as a lubricant. Scaife Co. is handling development and licensing of modified process based on closed dies. Use process in mortar shell production.

AUTO MERGER WON'T SOLVE ALL PROBLEMS — P. 46
For the officials of merger-born American Motors Co. the work has just started. Big job of welding Nash-Kelvinator and Hudson into a solid, aggressive organization capable of taking over a strong fourth place in the industry remains to be done. Advantages: pooling abilities, facilities, purchasing power.

CHANGES HIT AUTO INDUSTRY ON ALL FRONTS—P. 52
Birth of American Motors Co., a threatened dealers' revolt, the first gas-turbine-powered car and the opening of General Motors' 1954 Motorama were the main events in what was probably the auto industry's most frenzied 2-week period. On top of these were new car announcements, layoffs, a dozen others.

the Week in Metalworking

ENGINEERING & PRODUCTION

HIGH PURITY CHROMIUM: NEW ALLOY KEY — P. 93
One answer to the demand for materials with higher strengths at higher temperatures could lie in the development of a new series of chromium based alloys. A big roadblock is chromium itself. Recent studies have yielded a high purity chromium from which researchers have gained new data on its properties.

FOUNDRY CORE SAND IS DELIVERED BY AIR—P. 97
An unusual pneumatic system at Ford's Cleveland foundry delivers 960 tons of prepared sand to coremakers daily. One operator at a central control panel handles sand flow to each coremaking machine. Compressed air moves sand at high speed through a 4-in. pipeline. System is clean and saves valuable plant space.

BASIC DATA ON TITANIUM MACHINABILITY—P. 100
University of Michigan research teams find unusually high feeding forces are required. Machines must be exceptionally rigid to start and sustain cutting. Study showed titanium chips to be abnormally thin, with small contact area between chip and cutting tool. Tool tip temperatures are higher.

MULTIPASS WELDING INCREASES DUCTILITY—P. 104
Refinement of weld grain structure by repetitive heating and cooling in multipass welding produces many desirable characteristics compared to single-pass methods. Benefits are both metallurgical and physical. As succeeding passes reduce grain size, hardness also decreases and the ductility is improved.

CORED HOLES IN CASTINGS TAPPED FASTER—P. 106
Hydraulically powered rack and pinion setups drive the special lead screw-type taps on a new multiple tapping machine. Using a single clamping fixture, machine will tap 4 or more holes simultaneously. Holes to be tapped need not be in the same plane, may even be on opposite sides of the casting.

NEXT WEEK—NEW INVESTMENT CASTING TECHNIQUES
Development of a new precoating material and use of plastic patterns and centrifugal casting have greatly reduced the time cycle for ferrous investment castings. Low equipment costs plus high output per worker make the short cycle process competitive with other methods for producing intricate parts.

MARKETS & PRICES

SURVEY MICHIGAN STEEL MARKET PROSPECTS—P. 41
Since many Michigan manufacturers feel excess of steel use over output in their state is a threat to their future, Iron Age's Walter Patton was asked to study the prospects for new steelmaking facilities. He found, among many other things, that profits of Michigan steelmakers beat the national average.

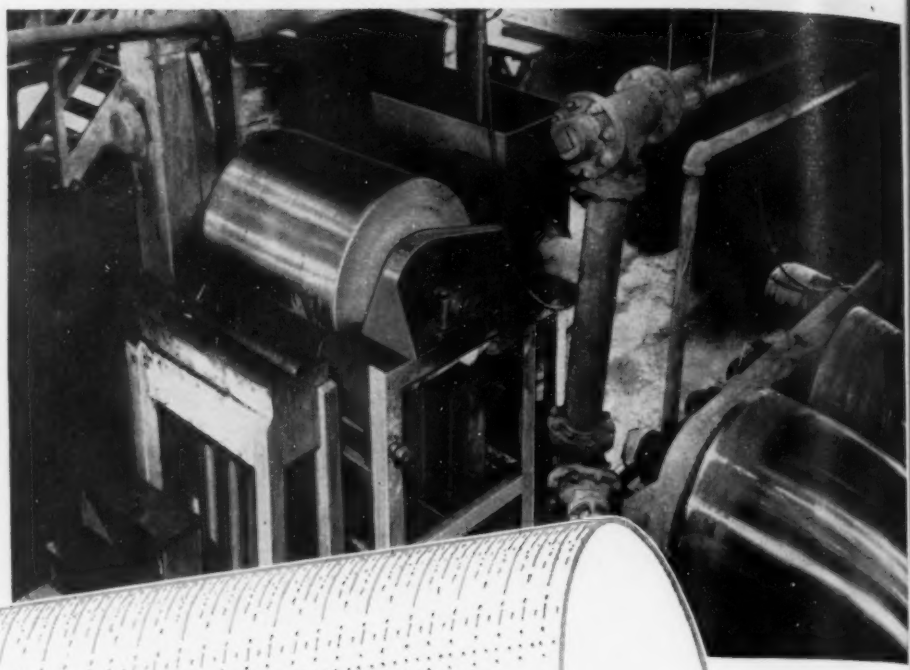
MORE TAX REDUCTIONS MAY BE ON THE WAY — P. 57
Top drawer tool of the Eisenhower Administration's kit of anti-recession implements is tax reduction—and it's being honed for action on Capitol Hill this week. Cuts would put more spending money in the hands of consumers and pump new life into lagging sales areas. Both parties are election-minded, too.

THIS MAY BE YEAR FOR BREAK ON TAXES — P. 63
Machine tool builders have their fingers crossed as they wait congressional decisions on new or revised tax policies. Builders hope this is the year they and their customers will get a reasonable and realistic tax depreciation policy. President Eisenhower's State of the Union message was encouraging.

UNEMPLOYMENT DIRGE SAPS BUYING OPTIMISM—P. 65
Maybe you can't yet genuinely convince the worker that the fractional rise in unemployment will soon clobber his security. But yell calamity long enough and you can undermine his buying optimism. That's why unemployment outcries, some of them politically motivated, have put a tremor in the economy.

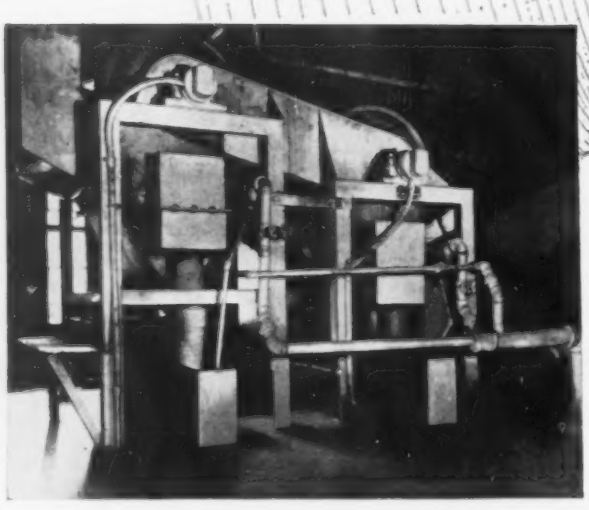
FIRST QUARTER STEEL ORDERS DISAPPOINTING—P. 117
Although steel business is still at a good level, even the optimists admit that first quarter orders have been disappointing. Business has been increasing, but the upturn hasn't been as rapid as had been expected. The next few weeks will be decisive. It will take a real spurt of business to bring the ingot rate over 80.

COPPER, LEAD, ZINC PRICES SAG IN LONDON—P. 120
Possibly forecasting declines on this side of the Atlantic, copper, lead and zinc prices all tumbled last week on the London Metal Exchange. Late last week all were below the equivalent U. S. quotations. Custom smelters immediately trimmed copper scrap buying prices though export demand still existed.



Jeffrey Counterflow Rougher and a Two-Drum Jeffrey-Steffensen Separator at Scrub Oaks

Jeffrey Drum-Type Magnetic Separators Simplify Flowsheets, Increase Recoveries



Type C-2 Cobbers in operation at Oxford

Alan Wood Steel Company, Conshohocken, Pa., has simplified flowsheets and improved metallurgy by converting its mills at Scrub Oaks and Oxford to Jeffrey Drum-Type Magnetic Separators. The installations have resulted in an increase in recovery and sizable savings in floor space requirements.

Scrub Oaks mill will utilize 11 drums, including Type C-2 Cobbers for primary roughing . . . Counter-flow Type Roughers on both rod and ball mill products . . . Jeffrey-Steffensen Two-Drum Separators for final concentration of fine products.

At Oxford two Type C-2 Cobbers with a common drive handle #20 mesh portion of roll crusher product, producing a final concentrate, a low-grade tailing, and a middling product that returns to crusher in closed circuit.

Write for descriptive literature and technical data

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Dear Editor:

Letters from readers

Clarification

Sir:

I deeply regret that through unintentional oversight certain facts were not explicit in my article "How Machinable Are The Cast Irons?", in your Nov. 19 issue. I submit the following statement to help insure accurate interpretation of the article.

The three malleable iron compositions on which machinability tests were made were straight cupola malleable irons produced solely for pipe fittings. Such iron is not representative of that produced by the bulk of the malleable iron industry but is a special low-strength, low-elongation material made expressly for use in light section pipe fittings.

It does not have the tensile test properties of Grade A or Grade B malleable iron which has minimum ASTM specifications of 50 to 53,000 psi ultimate; 32 to 35,000 psi, yield ultimate; 32 to 35,000 psi yield and 10 to 18 pct elongation. Much of this high-grade malleable iron is being produced with average values considerably higher than these minimum specifications.

The article is strictly limited to a comparison of the irons that were examined. Unfortunately, I did not clearly state that I was studying a lower grade malleable iron, insofar as graphite structure and physical properties were concerned. I was concerned chiefly in determining the relative machinability of gray, malleable and nodular irons.

Also I was interested in showing how a low-strength, low-ductility, coarse graphite, ferritic material would have the best machinability index of any type and hence confirm the opinions held by leading metallurgists on the effects of ductility and microstructure on machinability. This I was able to do with the selected cupola malleable irons. There is no doubt that in the higher grade malleables the better distribution and the more compact nature of the graphite account for the higher tensile test properties and better pressure tightness.

The object of this article was to present the results of an introductory phase of a program concerned with the development of metallurgical additives which will improve the quality of all types of cast iron. It was not presented to promote any particular type of cast iron by comparing the respective physical properties of the three types.

The intended limitation of the data in Table I was that it applied only to the cast irons prepared for this investigation and not to cast irons in general. Again it should be restated that the results pertain solely to irons melted in the acid lined cupola.

E. A. LORIA
Senior Engineer, Research & Development Branch

The Carborundum Co.
Niagara Falls, N. Y.

Magnetostriction

Sir:

We understand that there is a new method of cutting, shaping or marking metals which is called Magnetostriction which utilizes sound waves or some other vibratory method to cut, shape or mark the metal.

We would appreciate your letting us know who manufactures the equipment to do this type of work.

B. KAPLAN

Kastar, Inc.
New York

Among the companies who manufacture this equipment are: Mullard Electronics Products, International Electronics Corp., 137 Hudson St., New York; Raytheon Mfg. Co., 90 Willow St., Waltham, Mass.; and Cavitron Equipment Corp., 42-26 28th St., Long Island City, N. Y.—Ed.

Southern Growth

Sir:

Request permission to reprint in forthcoming Business Review & Forecast edition of *The Charlotte News*, correspondent Fred L. Allen's article "How Far Along Is Industrial Development of the South?" in your Nov. 12, 1953 issue. Will give full credit to Mr. Allen and THE IRON AGE.

B. S. GRIFFITH
Executive Editor

The Charlotte News
Charlotte, N. C.

Sir:

Please send me a reprint of the excellent article "Salute to the South" that appeared in your Nov. 12 issue.

J. R. DAVIDSON
Advertising Manager

Lake Erie Engineering Corp.
Buffalo

Still Available

Sir:

Would you please send 12 copies of THE IRON AGE "Welding Rod and Electrode Charts" which appeared in the Dec. 10, 1953 issue.

M. D. KIESSLING
Metallurgical Engineer

Chrysler Corp.
Huntsville, Ala.

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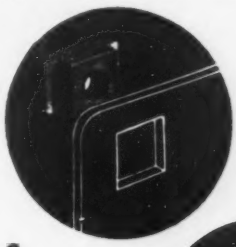
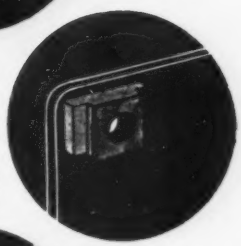


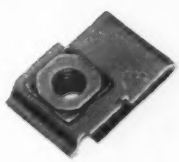
1 The square shape simplifies installation.

2 The small square portion is inserted and protrudes through the square hole that has been previously punched.



3 The protruding portion is now clinched at 4 corners with swaging tool.

4 Nut cannot work loose and variation in thickness of metal is taken care of automatically.



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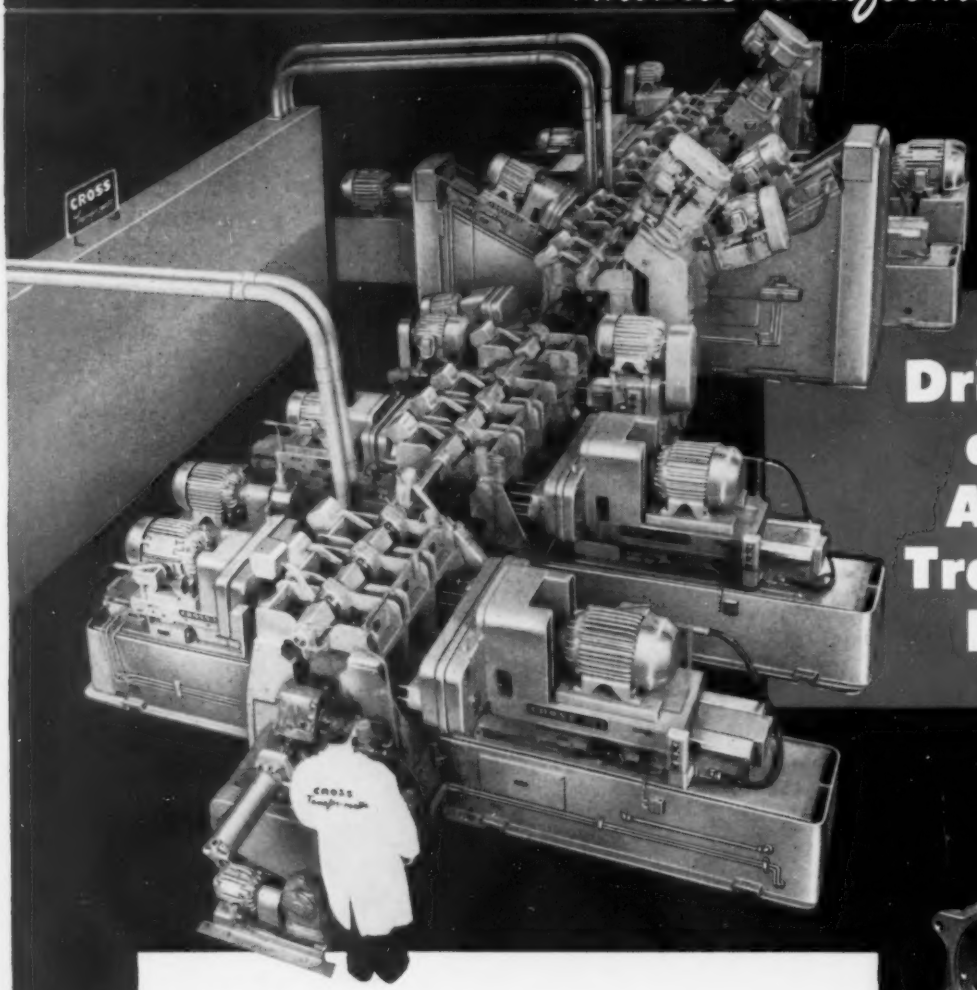
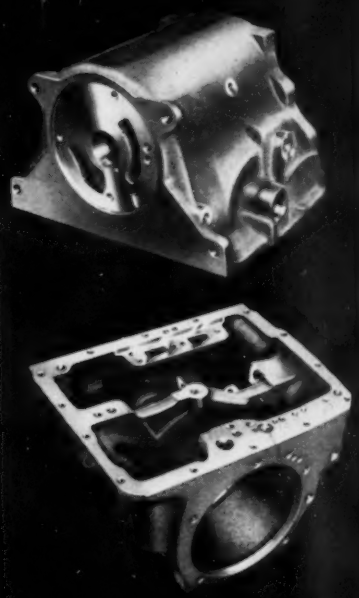
Another Transfer-matic by Cross



Drills, Reams and Taps Automatic Transmission Housings



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Fatigue Cracks

by William M. Coffey

China's Iron Age

Been reading *The Daily Worker* lately? The issue of Dec. 20? If so, you must have seen BIG BUSINESS MAGAZINE TELLS OF CHINA'S IRON AGE. That was the headline. The story told how our Oct. 22nd and Nov. 26th issues expressed "considerable amazement at China's progress." Course, a few words were left out here and there, some sentences were rearranged, you might even say the facts were a bit garbled, but you just couldn't help but feel that we thought industrial Red China under the enlightened regime made Pittsburgh, Detroit, Chicago and Philadelphia look like something put together by Gilbert's No. 2½ Erector Set, the one without the electric motor.

Here's the way they put it: "Several issues of the magazine IRON AGE published by McGraw Hill (ouch!), have expressed considerable amazement at China's progress." Now we didn't say that. We did report "Red China's *program* as substantial but still in its initial phase with immense obstacles remaining."

The technique, of course, is about what you'd expect. Take this sentence, for instance, which quotes IRON AGE: "At Anshan the Japanese-built integrated steel works, largely destroyed in the war . . . is being rapidly rebuilt." What we actually said was this: "At Anshan the Japanese-built integrated steelworks, largely destroyed in the war *and partly dismantled by the Russians*, is being rapidly rebuilt." Now why did they leave out that bit about the Russians? Naughty, naughty, little comrades.

. . . and another example of dirty ball. *The Daily Worker* said that we said: "The Chinese pavilion (we reported on the Leipzig Trade Fair in East Germany. Ed. Note) displayed a score of machine tools which showed a marked improvement over those displayed last year." We actually said: "*Although outdated*, a score of machine tools showed a marked improvement over those displayed last year." These are a few samples.

We have *editors* who can better describe the ethics of *The Daily Worker* type of journalism than we can. About all we can say is that to be quoted in *The Daily Worker* is the penalty for being the number one industrial magazine in the world.

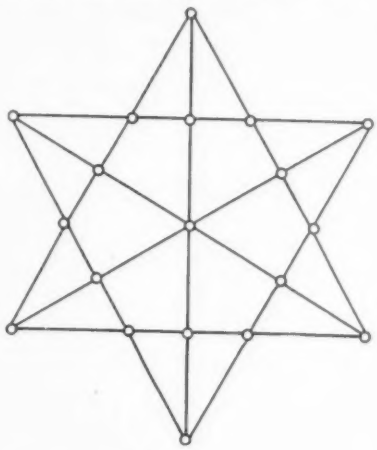
Progress?

Here's a much more pleasant subject. The Dept. of the Interior has extended the terms of three Indian Chiefs. It's information Service Bulletin says, "Secretary of the Interior Douglas McKay has extended through June 30, 1954, the terms of office of three principal chiefs of Oklahoma Indian tribes—William W. Keeler, Cherokee, Harry J. W. Belvin, Choctaw and Marcy Cully, Seminole." The old West sure ain't what it used to be when Keeler, Belvin and Marcy Cully can replace Itchy Fingers, Running Nose and Laughing Moose.

The Bulletin also says that under Federal law the authority to appoint a principal chief for each of the three tribes is vested in the President of the United States. Guess we got behind the times. Somehow, we had the old idea that an Indian Chief was something like royalty—that he held the job 'till some junior scalped him or Father Time caught up to him.

Puzzlers

This is what the King's Orchard would look like (Dec. 17 Puzzler):



New Puzzler

John Cluck of the Lufkin Foundry & Machine Co., Lufkin, Texas, says that if you misspent your youth this puzzler should offer no trouble.

A cue ball is at rest on a pool table against an end cushion and midway between the sides. At what angle from the end cushion must the ball be hit to bounce it off the three other cushions and return to the starting location?

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Photos courtesy David Round & Son, Inc., Cleveland, Ohio.

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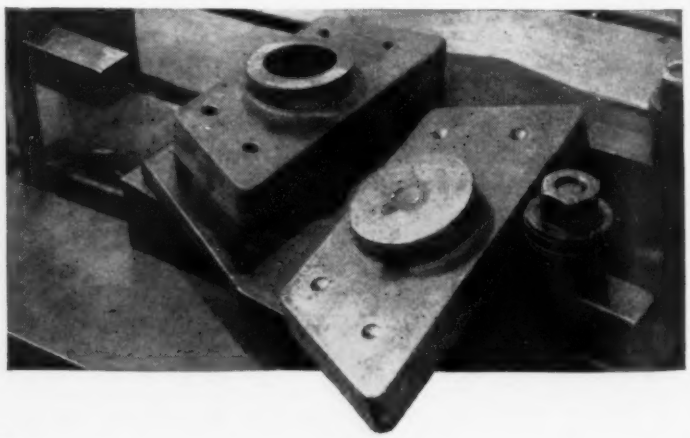
Write for Catalog R-29.



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Business Planes Save Time, Earn Money

Company ownership of multi-engine planes has shot from 50 in '45 to over 1200 today . . . Speed, comfort, convenience are advantages . . . Detail the costs—*By R. L. Hatschek.*

Business aviation has been one of the aircraft industry's fastest growing phases since the end of World War II. The reason is simple: It pays business to own planes.

When peace returned in 1945 less than 50 multi-engine aircraft were in use by private enterprise. Most conservative estimate today is that there are 700 U. S. firms not in the aviation business flying over 1200 multi-engine ships of their own. Since many of the single-engine planes used for business are registered in individual's names it is practically impossible to count these—but they number in thousands.

Fleets range from a single plane to General Motors' 25. Plane size runs from single-engine light planes up to converted four-motor bombers such as Continental Can Co.'s modified B-24 Liberator which flies a coast-to-coast sleeper run.

Costliest fleet is the one operated by Arabian American Oil Co. This firm owns three 4-engine planes, 14 twin-engine planes and two single-engine planes. Biggest ones are used for overseas flights, the others for flights around the Middle East.

Advantages are gained for sales, production, maintenance, engineering, plant liaison and other departments as well as for top level executives. Speed, comfort and convenience are the major advantages. And they draw compound interest when a good customer needs quick delivery or technical assistance in emergencies.

"A Flying Billboard"

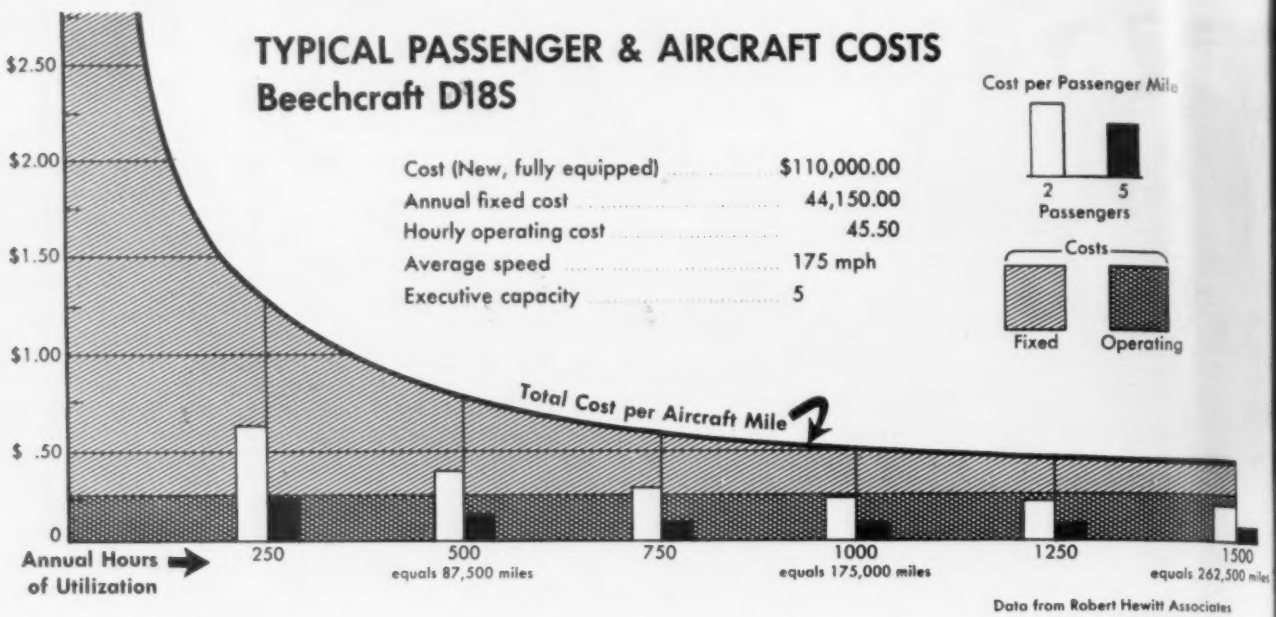
While it's difficult to show the advantages of company aircraft in a profit and loss statement, a top reason for operating a private airline is that it permits the busy executive to do what he otherwise wouldn't or couldn't. And there's no timetable to meet, so the executive can spend exactly as much time as he needs to get something done at that out-of-the-way plant. If there's extra time, he can stop off to see that important customer, too.

Prestige factor, though intangible, is not to be overlooked. Advertising value was well summed up when one executive termed the company plane "a flying billboard." Almost all firms display their insignia, trademarks or slogans prominently on their planes.

Plane Doubles Business

Firms off the major airline routes or with scattered plants in out-of-the-way locations find airplanes a real help. Rockwell Mfg. Co. uses a Sikorsky S-55 helicopter for runs from its Pittsburgh main office to seven plants within a 205-mile radius. A major consideration in choosing the helicopter over a plane was the time required for traveling from airports to office and plant sites. Enlarged parking lots take care of the helicopter's airport needs.

A small used equipment firm, Machinery Co., Mishawaka, Ind., credits its five-seat Cessna 195 with doubling business by letting its owners cover more ground than they ever could by auto. Rynel Corp., a gear manufacturer, states



Data from Robert Hewitt Associates

that its order backlog zoomed from $30,000 to $300,000 within 30 days after it bought a twin-engine Beechcraft D-18. While this was early in the Korean war boom, Rynel gives the plane a large measure of the credit.

Of the more than 1200 multi-engine planes operated by industry, approximately 45 pct are twin Beechcrafts powered by 450 hp engines. Passenger capacity is five to seven with a cruising speed of about 175 mph and a range of up to 1100 miles. Price tag for a used one starts at $35,000, while new ones will cost $93,000 and up.

In a virtual tie for second place are the Douglas DC-3 and the Lockheed Lodestar. These two types comprise another 40 pct of business' multi-engined fleet.

The DC-3 can carry up to 21 passengers though most firms have them fitted out for 12 to 15. Cruising speed is 170 to 190 mph depending on the engines used and range is 1500 miles with extra fuel tanks added. Initial cost will run from $100,000 to $200,000 depending on equipment and interior. Annual fixed cost for a typical DC-3 is about $60,000 and hourly operating costs are figured at about $67.

Lodestars are usually fitted for seven to ten passengers, cruise at 185 to 200 mph depending on horsepower, and have a range of up to 1500 miles with additional fuel capacity. Purchase price varies from $80,000 to $150,000.

Prices for twin-engine amphibious craft range from $15,000 to $120,000. A used four-place single engine plane can be bought for as little as $5000 while others in this class run to perhaps $20,000.

One firm estimates its annual cost for a Cessna 195 at close to $16,000 including depreciation, crew salary, maintenance, fuel, etc. The plane flew 822 hours for a distance of 115,000 miles in that year, resulting in a cost per mile of less than 14¢. Full utilization of the plane's four seats would result in a cost per passenger-mile of 3.5¢.

High Use Pays

No one denies that owning and operating an airplane costs money. But the more it's used, the thinner fixed costs are spread. These include amortization of the purchase price, crew salaries, hangar fees, and insurance. Operating costs, such as fuel, oil, repairs, overhaul, and maintenance, depend on how much the plane is used.

The graph of total cost per mile of operation tends to flatten out at about 600 hours of annual utilization. In most cases, firms thinking of buying aircraft should plan to use them at least this much.

Cost per aircraft mile is practically independent of the number of passengers carried. Obviously if two are carried instead of one, the cost per passenger-mile is halved; if four, cost is cut to a quarter and so forth. In this way, intelligent scheduling of company airplane trips will really pay off.

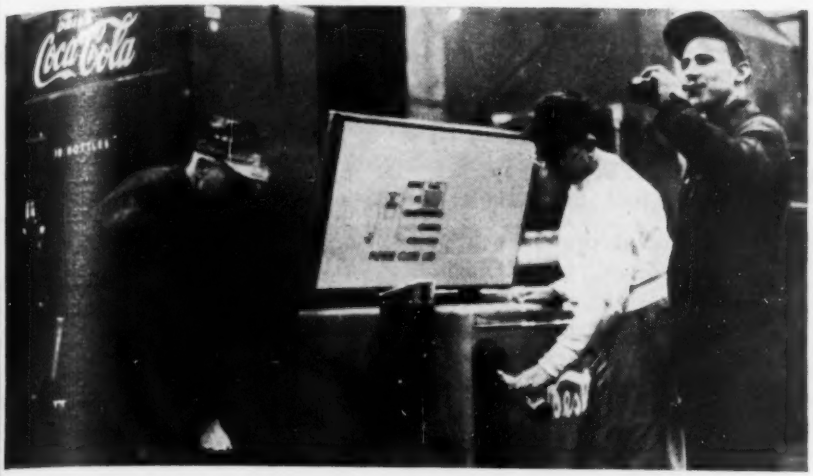
Twins, if they are operated legally according to Civil Aeronautics Administration specifications on weight and balance, will fly with only one engine. Because of this extra safety margin, they are generally preferred by business.

Safety precautions vary from company to company, but since these craft are used for transporting expensive executive talent, standards are invariably among the highest. In general, business planes carry the latest in radio gear, safety devices and all-weather instrumentation.

As a further precaution to protect investment in top management, many firms will not permit all their high level executives to fly on one trip.

Some companies are hesitant in acquiring aircraft because they fear adverse stockholder reaction. It's true that the assets of operating a company plane are pretty much intangible. In some cases this is offset by operating the company fleet just like an airline. Airline rates are charged.

But whether or not this puts the company plane into the black, it must be remembered that fullest utilization of the executive's time increases his value.



SNACK VENDORS: Pay Union Benefits

Vending machine profits at Pittsburgh Steel plants go to union welfare funds . . . On-the-job snack, drinks another morale booster . . . How welfare system works—*By J. B. Delaney.*

Every time a steel worker drops a coin into a vending machine at Pittsburgh Steel's Monessen and Allenport plants he not only gets a snack but contributes to his union's welfare fund.

By donating all vending machine profits to this fund, Pittsburgh Steel adds to better labor relations with each candy bar and coke sold. Another worker convenience is the on-the-job availability of these mechanical snack salesmen. Prices are as low, sometimes lower, than retail stores of plant communities.

Happy Arrangement

Vending machine earnings supplement welfare fund dues paid by the workers at Monessen plant, where dues account for the bulk of the fund nest egg. At Allenport, the fund depends entirely on concession profits.

It's a happy arrangement all the way 'round.

From a management slant, it relieves the company of responsibility and detail in operation of the vending machine concession.

And, even more important, the workers, having a personal interest in earnings of the machines, are more conscientious about returning empties and keeping the merchandise juke boxes in good working order. The frowns of fellow workers usually are enough to discourage any vandalism.

Since it means dollars and cents for the Welfare Fund, union officials and members actively promote good housekeeping. They are telling workers the Monessen fund would have made about $1000 more in 1953 with a little more effort on housekeeping and more care in handling machines.

Industry as a whole has been invaded by thousands of vending machines. They not only make a plant "a better place to work" but solve some of the in-plant feeding problems. By installing batteries of robot salesmen some firms have been able to dispense with plans to open plant cafeterias. What do these machines sell? Anything from apples to hot drinks.

Help Pay Benefits

When vending machine earnings go into local funds, they help pay benefits to workers away from their jobs because of sickness or accidents, or in case of actual need for other reasons. The payments supplement benefits under the regular insurance program and Workmen's Compensation at Monessen, and tide many a needy family over a rough spot at Allenport.

Last year the Monessen local union got about $4500 from operation of concessions covering about 100 machines. Allenport realizes profits from 75 machines. Earnings average 10 pct of gross sales.

The plan got underway in 1947 when both local unions launched their own welfare funds. At that time Pete Sance, vice-president in charge of operations, agreed to a union proposal to run some of the vending machines and keep the profits. Last year the locals took over the entire operation, with company blessing.

At Monessen, Workmen's Compensation cases are paid 50¢ a day —$3.50 per week. Added to state compensation of $31.50, the total is $35. Other sickness and nonplant injury cases receive $1 per day which with insurance adds up to $37 per week for a possible 15 weeks. In an average month the Monessen local will pay out about $2000, service about 75 claims. Total payments last year: $25,000.

At Allenport, $50 checks are given to needy families certified by a local union committee. Payments in 1952 were $5500, were about $4000 last year.

NLRB Won't Rehear Union Petition

The National Labor Relations Board has issued a new rule to cover cases in which a union withdraws its petition for a representation election after the NLRB has completed a hearing on the petition. Effect of the new rule is that the NLRB will not consider a new petition from the withdrawing union for an election among the same employees during a period of 6 months, unless good cause is shown.

New ruling also applies in two other types of cases: (1) where a union disclaims interest in representing the employees after an NLRB hearing has been held on an employer's petition for an election, (2) where a union files such a disclaimer after an NLRB hearing on a petition by a group of employees for an election to "decertify" the union.

PLASTIC PIPE: Steel Firms Join In

Producers of steel pipe have been among the first to see advantages of plastic pipe . . . Result: Two producing it, a third experimenting, others studying—By *J. B. Delaney*.

Two major steel companies are now getting their feet wet in the plastic pipe business. A third has been producing plastic pipe experimentally, may go into it commercially. Others are making no secret of their interest, have spent considerable time and money investigating production costs, earnings and market potential, and material availability.

Reason for steel company interest is not surprising—plastic pipe can beat the pants off steel pipe in some applications. So steel producers apparently are swinging around to the philosophy, "If you can't lick 'em, join 'em."

Show Much Interest

Youngstown Sheet & Tube Co., which last August acquired an interest in the Fibercast Corp., announced that full production of plastic pipe for oil field applications is under way at Sand Springs, Okla. Fibercast produces a centrifugally-molded pipe of Bakelite polyester resins and Fiberglas mat. It was first produced commercially nearly 3 years ago after a year of development by Perrault Brothers, Inc., Tulsa, Okla.

Aluminum Twice as Heavy

Republic Steel Corp. operates a plastic pipe division, having acquired the Owings & Sharp Co., of Magnolia, Ark. National Tube Div. of U. S. Steel Corp., has been extruding pipe experimentally for more than a year. Jones & Laughlin has compiled a mass of production and market details.

Fibercast will be marketed through three Youngstown subsidiaries—Continental Supply Co., Youngstown Steel Products Co., and Youngstown Steel Products Co. of California.

Designed primarily for use under severe corrosive conditions, Fibercast has been field-tested by several oil companies, has stood up well in such applications as salt water disposal and sour oil gathering lines. Where metal pipe gave 6 months service, Fibercast is still being used after 2 years. Its producers foresee applications in other fields as well.

Laboratory tests indicate the pipe will withstand stresses of over 10,000 psi. High burst, collapse, and beam strengths also are indicated. The pipe weighs about one-fifth as much as steel, one-half as much as aluminum.

Fibercast costs more than steel —about $2.50 per foot for 3½-in. tubing. This is offset by lower replacement costs, lower freight costs, easier handling, greater flow capacity, and by eliminating necessity of protective coatings.

How It's Made

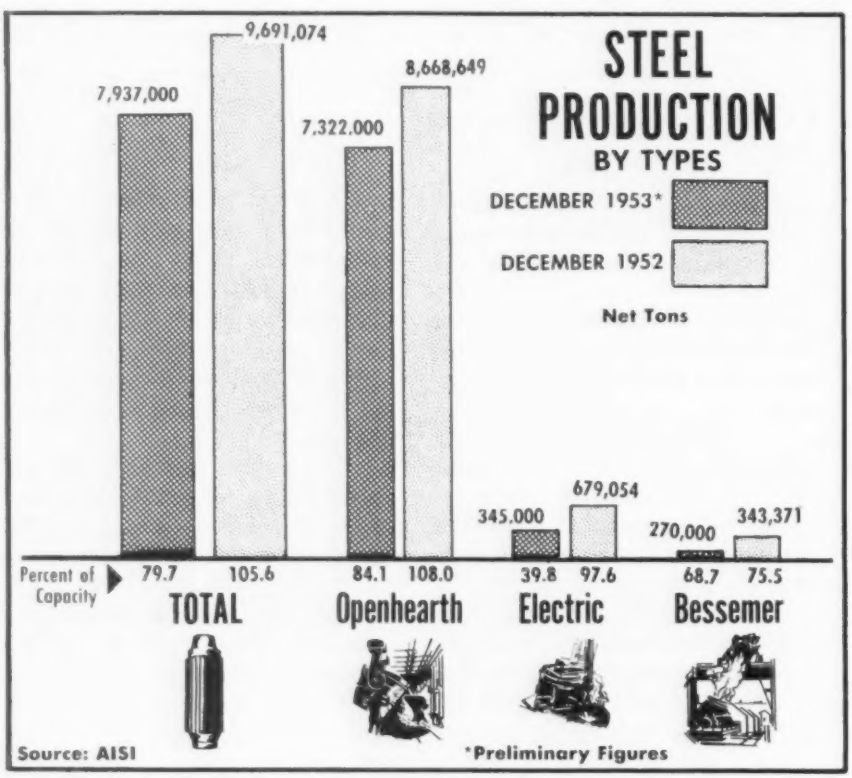
In a salt water disposal well installation in Claflin, Kansas, a four-man crew put down 3420 ft of tubing in 8 hours running time. At Jennings, La., in 1952, 17 lengths of 20-ft tubing weighing about 7000 lb., tested full capacity of tensile strength before touching bottom 3495 ft down. A similar installation was made later at Great Bend, Kansas.

Fibercast is manufactured by wrapping a fiberglas mat loosely around a mandrel. This is placed on a cylindrical mold and spun rapidly while the blended resin solution is sprayed on. After leaving the mold the pipe is cured in a gas oven.

Line pipe and tubing are made in three wall thicknesses in outside diameters of 2⅞, 3½ and 4½ in. Tubing weights vary from 1 lb for a standard length of 3½-in. tubing to 50 lb for 4½-in. tubing. Internal and external operating pressures are 300 and 500 psi, respectively. Ultimate burst pressure is 1200 psi and ultimate collapse pressure 1500 psi.

Line pipe is made for operating pressures of 100 and 200 psi.

The pipe can be joined by screw threads, flanged joints, grooved joints, cemented joints, plain-end couplings, other fittings.



CREDIT CARDS: Living on the Cuff

Charge craze has resulted in development of many credit clubs . . . Charge system provides permanent record of entertainment expenses for tax purposes—*By E. C. Kellogg.*

Ever since World War II Americans have been on a live-on-the-cuff binge. Charge accounts, installment buying, credit cards and other "don't pay today what you can pay tomorrow" schemes have flourished. Consumer indebtedness, which was piddling $8.38 billion in 1946, has risen every year since then and at the start of this year amounted to a record $28 billion.

Practical businessmen, too, have picked up the convenient charge habit. And to take advantage of the executives' desire to sign for it, numerous credit card organizations have been formed which make it easy to sign the tab for luncheons, dinners, hotel bills, gifts, travel and many other expenses.

Get $5 Bookkeeper

One of the main advantages of these charge systems is that the monthly bills sent out by credit organizations serve as permanent records of entertainment expenses for tax and expense account purposes. In effect the businessman gets a part-time bookkeeper for $5 per year—the average cost of joining one of the credit clubs.

In addition there's the convenience of having to pay only one bill for a variety of expenses and less cash is needed for road trips.

It also appears that many companies are using credit card systems to keep their employees' expense accounts honest. It's pretty hard to juggle a swindle sheet when most of the items are on a charge basis.

What About All-Purpose Card?

Giant in this type of credit card service is the Diner's Club which makes it possible for members to sign bills in leading restaurants, hotels and nightclubs in all major U.S. cities as well as Canada, Mexico, Hawaii, Puerto Rico, Cuba and Europe. Diner's Club cards are also honored in some florist shops, auto rental agencies and just recently in a Texas liquor store chain.

Established early in 1950, the Diner's Club now has 110,000 members who spend nearly $24 million per year in the 3000 restaurants and other establishments participating in the Diner's Club plan.

While it would be ideal if some firm could come out with a credit card that would enable a businessman to charge anything, anywhere, most informed sources in the credit card business believe there is little likelihood such a system will ever evolve.

Main factors limiting possibility of a national, all-purpose credit card organization are the tremendous increase in credit risk and fantastic bookkeeping and management problems.

Nevertheless there is a growing tendency for credit card organizations to increase the scope of the services they provide. One fairly new credit card firm, Trip Charge, Inc., headquartered in Pittsburgh, perhaps comes nearest to providing an all-purpose credit service.

Under the Trip-Charge plan it might be possible for a businessman to take a lengthy trip without spending any cash at all. Among the types of services which can be charged on a Trip-Charge card are: airline tickets (North American), hotels, motels, restaurants, garage services, clothing, flowers, fruit, department store purchases, candy, liquor, gift wares, theatre tickets, drycleaning, car rentals.

Trip-Charge, in operation since the fall of 1952, now has around 35,000 card holders who can sign tabs in about 2000 establishments ranging from Le Ruban Bleu in New York to Hutsie's Harbor House in Waukegan.

How New Plan Works

As in most other credit card plans members are charged a $5 registration fee each year and receive one bill monthly covering all the charges made.

The company is now pushing an even more adventurous program under which firms participating in the Trip-Charge plan will honor all recognized credit cards such as oil company cards issued for gasoline purchases, airline charge cards and American Hotel Assn. check cards.

In operation this means that a businessman could use an oil company credit card to charge a dinner in a Trip Charge restaurant. Although no reliable figures are available on the number of oil company cards that have been issued, one rough estimate places the total at around 8 million. This gives some indication of the plan's potential.

Drawback for the user is that as yet there are only 350 firms that will honor "foreign" cards (credit cards not issued by Trip-Charge) under the Trip-Charge arrangement. It is expected that as the program develops there will be a rapid expansion in the number of firms taking part.

Difference between the straight Trip-Charge card plan and the new foreign card program is that Trip-Charge cardholders have unlimited credit and are given only one bill each month. When a foreign card is used the bill is sent immediately.

You Can Sign for It

Under the many various credit card systems that have developed during the past few years, a businessman can charge the following services:

- **Restaurants**
- **Hotels**
- **Motels**
- **Nightclubs**
- **Liquor**
- **Drycleaning**
- **Garage services**
- **Candy**
- **Clothing**
- **Gift wares**
- **Transportation**
- **Theatre tickets**
- **Flowers**
- **Fruit**
- **Department store purchases**
- **Car rentals**

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credit is limited and no credit is given on items which cannot be consumed on the spot. In other words you can't use an oil company card to buy your wife a $5000 mink.

Another credit card firm, Who's-Who Credit Club, New York, in addition to making it possible to sign bills in restaurants, hotels and some gift shops, also operates as a charge account travel agency. Under this system a businessman can get his plane, train or ship ticket and hotel reservation and be billed at the end of the month.

Nice People—Little Business

Formed little more than a year ago, the original plan of the Who's-Who Club was to restrict membership to people listed in the *Who's-Who* directory and to concentrate on the better restaurants on New York's East Side. Result, one company spokesman told THE IRON AGE, was that Who's-Who had some very prominent members and some swank clubs participating, but the billing volume wasn't sufficient.

Since then membership has been broadened to include anyone with a good credit standing, and firms participating in the program are no longer limited to New York. One other difference in the Who's-Who Credit Club operation is that there is no membership charge. Including some other affiliated credit card organizations, Who's Who says it now has about 60,000 card holders.

(The credit card organizations described in this article naturally do not make up the entire credit card field. They are mentioned only to give a cross-section of the types of credit services that are available.)

THE IRON AGE
-ALI-

"By George! Your desk cleared already—you're a magician."

STEEL: How's the Michigan Market

Many manufacturers feel state's excess of consumption over output threatens future . . . Current expansion won't end the deficit . . . Study prospects for new steel facilities.

What would be the prospects for new steelmaking facilities in Michigan? Since many Michigan manufacturers believe that the excess of steel consumption over production in their state constitutes a threat to their industrial future, the Michigan Economic Development Commission wanted to find the answer.

A market study of the state's steel supply problem was deemed necessary and Walter G. Patton, Assistant Technical Editor of THE IRON AGE, was asked to prepare the report. Here are the highlights:

Expansion Won't End Deficit

While Michigan produces a large share of its cold-rolled sheet requirements, its output of other steel products, used in large quantities by the auto industry, is substantially below the needs of the area.

It is estimated that about 42 pct of the state's steel needs, excluding structural, are produced in Michigan. And, the report shows, the long-term deficiency in steel production will persist after current expansion programs in the area are completed.

During periods of shortage, some of the larger consumers in the district are often forced to supplement regular mill supplies by the purchase of conversion steel—at a premium price. Many of the smaller consumers, even if they are willing to pay the premium, cannot obtain steel at reasonable prices.

Profits Higher in Michigan

Bar and wire products appear to offer the best marketing opportunities for new steel capacity in Michigan, although they may not be best from the standpoint of return on investment. Selling price, production costs, product mix and a number of other factors determine the yield on the money invested.

Financial statements show that firms investing in steelmaking facilities in Michigan have earned higher returns than the average for the steel industry throughout the U. S.

Local producers have been charging higher base prices than out-of-state competitors. But this margin has been shaved in recent months and most steel products are now equalized as far as the delivered price to the Michigan consumers is concerned. "Equalization" is made possible in two ways: (1) through freight absorption and (2) by adjustment of extras.

List Freight Rates

The outlook at present is for strong competition among various producers for Michigan's highly desirable steel business. Low freight costs are important whether they're being absorbed or not. Since Michigan represents a healthy share of the U. S. steel market (17.7 pct in 1951), elimination of long hauls is not to be disregarded.

Typical existing freight rates, including tax, are: From Pittsburgh, $8.29 per ton by rail, $8.34 by truck; from Chicago, $7.82 by rail, $7.83 by truck; from Buffalo, $7.23 by rail, $8.86 by truck; and from Cleveland, $5.92 by rail, $5.80 by truck.

Cites Technical Progress

A $1 per ton Detroit switching charge must also be added and a shrouding cost of $2 to $3 is not included in the rail figures. Water shipment is approximately a quarter of the cost of rail freight. A major auto firm, taking advantage of cheap water transportation, buys flat-rolled steel in Buffalo, ships by boat, and lays the steel on its Detroit dock at about the same price charged by a major Detroit mill.

Mr. Patton cites a number of technological developments which can be expected to have some effect on the market for steel. Among them are: Progress in steelmaking, shell-molding and its probable effect on the forging-quality bar market, hot and cold-extrusion, and competition from other materials such as aluminum, magnesium and various plastic materials.

Under economic developments that will be felt in the Michigan market are: New steel plants in the East and the Ohio-Illinois area which are creating more competitive conditions in Michigan, the movement of auto plants out of Michigan, and special consideration of the Detroit scrap steel supply.

Steel Production vs. Consumption

(Thousands of Tons)

	Used by Major Metalworking Industries**		Production	Ratio of Consumption to Production	Surplus or Deficit
	1947	1951*	1951*	1951	1951
Michigan	6,776	9,191	3,848	2.39	— 5,343
Illinois	4,983	6,411	6,644	0.97	+ 133
New York	2,101	2,258	3,968	0.57	+ 1,710
Penna.	5,590	6,835	23,485	0.29	+16,650

*Estimate

**Not including construction, mining, agriculture, railroad rails, construction and maintenance of power lines.

Chain:

Ancient skills, modern tools combine to make buoy chain.

Chain making is one of the most venerable of metalworking skills, dating at least back to the time of King Solomon. Despite mechanization and automation, the process, at least for large sizes, is still basically unchanged, still much of a hand craft.

Power hammers and shears and cold winding machines are now the order of the day, but quality of manufacture still depends largely on the skilled hands and eye of the individual artisan, as these pictures of chain making at Cleveland Chain & Manufacturing Co. show. Cleveland Chain is one of the four Round Chain Companies filling a recent Navy Bureau of Ordnance order for 14 million lb of buoy chain for anti-torpedo and anti-submarine nets.

Wrought iron bars, 1½ in. in diam and 25 to 30 ft long, are wrapped around a mandrel, forming a spring-like close-spaced spiral. Individual links 9 in. long and weighing 10 lb are cut from this and scarfed.

Links are furnace heated to 2800°F, slipped on the end of the chain, closed by a power hammer and beaten into shape by dies.

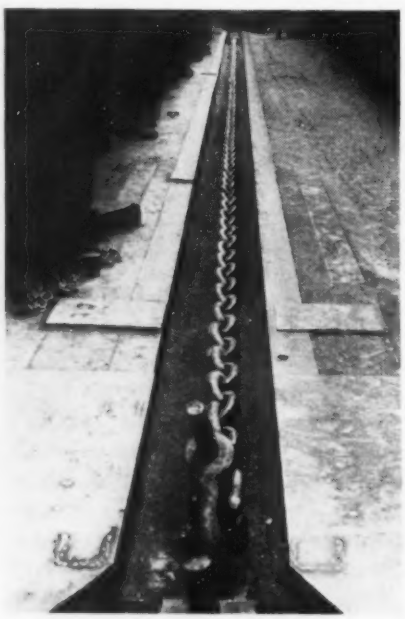
SPECIAL KNIVES on shear lop off and scarf links one at a time from coiled iron bar.

The anvil die which closes the weld on the inside of the link is called the nipple die; on the face of the hammer is the top die, which closes the weld on the outside to proper size and radius. Hand craftsmanship in the blacksmith tradition still plays an important part at this stage.

When 60 links have been joined, the 45-ft chain is complete except for inspection.

Each length of chain is tested to 60,840 lb by a hydraulic testing machine. Test channel is 100 ft long to permit testing of two lengths at once.

HEATED link is slipped into chain, closed by power hammer, and then shaped by dies.



TWO LENGTHS of finished chain are tested to 60,840 lb at same time hydraulically.

By a combination of modern equipment and traditional skills, the four firms on the job are turning out an average of 200 complete chains each week.

Freight Cars:

Government may pressure railroads to buy more freight cars

Government mobilization agencies can be expected to put more pressure on the railroads this year to increase their freight carrying capacity by stepping up the car-buying rate.

In spite of availability of materials, little improvement is noted in the freight car expansion program which was established early in mobilization planning.

Government action has been threatened in the past, however, and has never been too effective in forcing railroads to increase car purchases. Railroads maintain their car buying rate depends on their revenue, profit picture.

Don't Have Enough Cars

Deliveries of new domestic freight cars in December totaled 4456, bringing the amount put into the hands of the railroads to 81,021 for 1953 according to the year-end report of the Association of American Railroads.

This is about 39,000 cars short of what the government mobilization planners figure were necessary to provide an adequate mobilization base.

Nor does the Defense Transport Administration and other government agencies get much comfort when they look at the drop in backlog of freight car order backlogs.

As of Jan. 1, the AAR and car builders reported the car order backlog amounted to 29,950. A year ago, the figure was better than 80,000.

More than that, the freight car fleet is losing ground. Ownership of box cars over a year's time, as added up by DTA last summer, then amounted to roughly 733,000, a drop of 1000 over a 12-month period.

HOT EXTRUSION: New Family of Uses

Modified Ugine-Sejournet process using glass as lubricant opens new fields of hot working uses . . . Scaife Co. subsidiary to handle development, licenses—By *R. L. Hatschek.*

Hot extrusion of steel and other metals by the Ugine-Sejournet process may lead to a whole family of hot working operations based on the use of molten glass as a lubricant. Scaife Co. has just announced formation of a subsidiary for the development and licensing of a modified Ugine-Sejournet tube extrusion process. Basic patents are held by a French firm.

The modified process makes possible hot-forming of cylindrical shapes in all forgeable materials and offers advantages particularly in shapes and materials heretofore considered difficult to form, according to Mr. A. V. Murray, president of the newly-formed Scaife Development Co.

Basic difference in the two processes, THE IRON AGE learned, is that closed-end dies are used in the modified version as opposed to the open dies of the original. With the modified process, hot forming operations such as forging, drawing and reverse extrusion are possible. Scaife anticipates the method will be applied to making such products as high pressure containers and items requiring short (up to about 6 ft) tubular lengths with precise tolerances.

In the first production run of the process, 4.2-in. mortar shells were produced from one-piece simple billets. Quality is said to be better, costs lower and scrap reduced from the old method in which the shell was a three-piece assembly of seamless tubing and machined components.

Manufacture begins with heating an SAE 1035 carbon steel slug in a high speed gas furnace. Either powdered or fibrous glass is then applied and the slug is positioned in the press. Actual shaping of the metal takes less than a second.

The glass, melted by the heat of the slug, becomes a viscous lubricant between the die, punch and workpiece. This is said to extend die life, reduce extrusion pressure, improve surface conditions of the product and provide closer dimensional control than conventional hot forging methods.

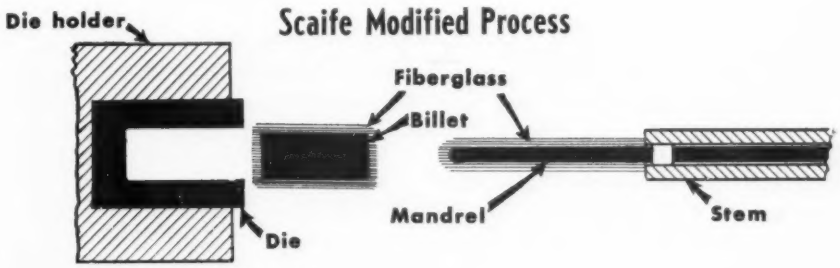
With this particular product seamless steel tubing is replaced by cheaper and generally more available billet stock and approximate savings of 25 pct in steel used are reported. In general, the raw material may be cast, forged or rolled bar stock.

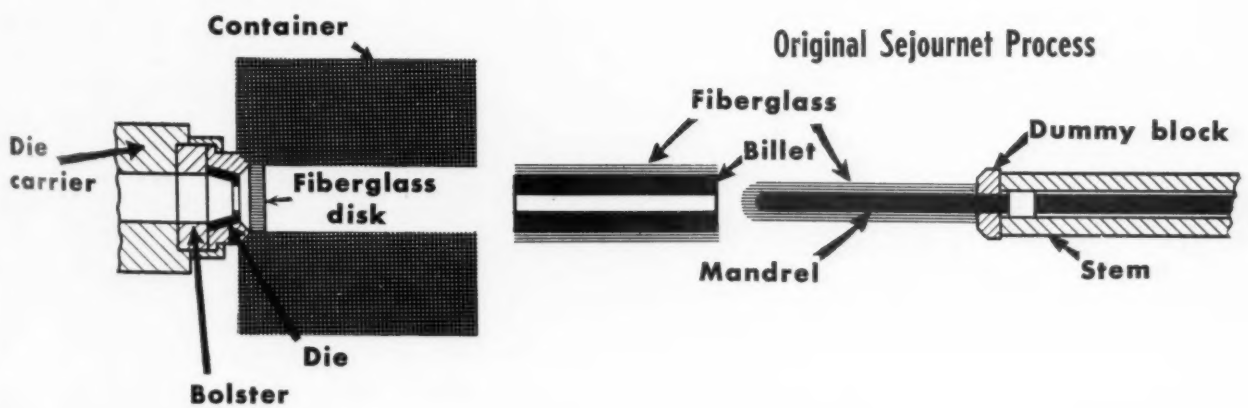
Scaife's method combines advantages of both hot-forging and cold-extrusion. As Mr. Murray puts it, "Hot-forging permits drastic reforming of material in a single press operation but generally with poor dimensional control; cold-extrusion provides close dimensional control but requires many press operations."

An extensive experimental and development program has been launched but so far only a few of the many possibilities have been investigated. In addition to the work done on the 4.2-in. mortar shell, Scaife has run tests on various different materials. Results have been most promising, the firm reports, though work to date has been somewhat limited.

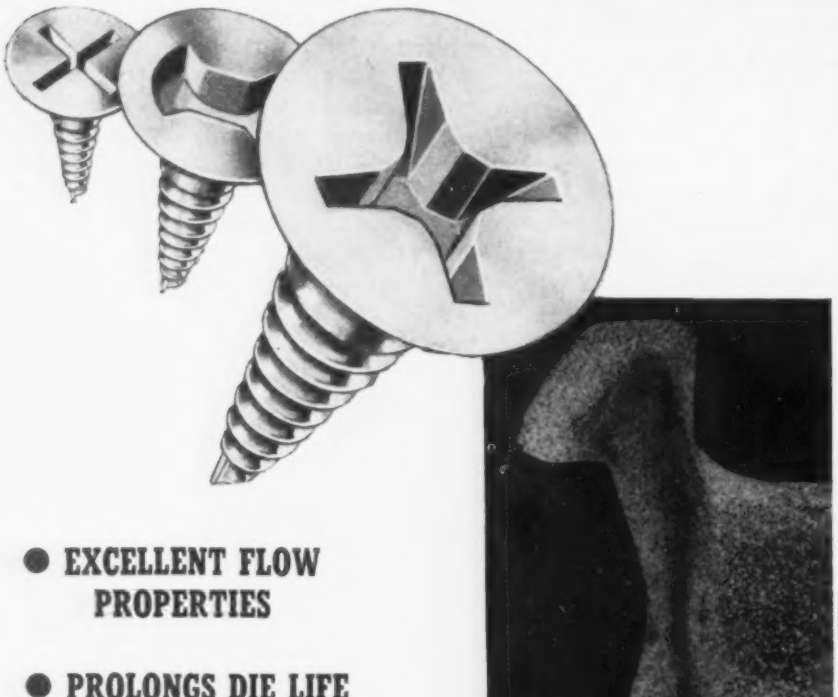
How Process Was Modified

Basic difference between original Sejournet tube extrusion process (below) and Scaife modification (right) is direction. In Sejournet, billet is forced forward through die with mandrel projecting through the die to maintain internal shape. In modified process, billet is forced into closed die and ram pressure squeezes it back over mandrel. Both are based on use of molten glass as lubricant.





KEYSTONE "SPECIAL PROCESSED" COLD HEADING WIRE



- EXCELLENT FLOW PROPERTIES
- PROLONGS DIE LIFE
- FEWER REJECTIONS
- REDUCES INSPECTIONS

The excellent grain flow properties of this superior cold heading wire assures the desired upsetting and die forming qualities you need for greater efficiency in the production of Phillips head, clutch head and cross-recessed head screws.

The structural soundness and uniformity of Keystone "Special Processed" Cold Heading Wire is attained by careful selection of raw materials, our own exclusive drawing and heat treating process, rigid quality controls and inspections. Compare the performance of Keystone "Special Processed" Cold Heading Wire next time you have a difficult cold heading problem to solve.

INDUSTRIAL WIRE SPECIALISTS

Keystone Steel & Wire Company
PEORIA 7, ILLINOIS

MINING: U. S. Output Hit

Mineral production set records in both volume, dollar value of $15 billion.

Spearheaded by a jump of 20 pct in iron ore output, the domestic mining industry brought more minerals out of the ground during 1953 than any year in history.

A U. S. Bureau of Mines summary shows production at a new high in both physical volume and dollar value. Total output for the year was estimated at nearly $15 billion.

Government Aid Continues

Meanwhile, the search for new reserves goes on with government help, reports Defense Minerals Exploration Administration.

The government will pay up to 75 pct of the exploration costs of projects certified by DMEA as showing definite promise of resulting in new discoveries. Some 606 such contracts have been signed since 1951.

Out of this total, some 275 of the projects have been completed or closed out, leaving 331 in effect as of Dec. 1.

Of the projects now written off, 50 were closed out before the government had invested any money. Of the remaining 275, 81 have resulted in discoveries at a cost to the government of about $2 million.

Nonferrous Output Slips

Highlight of last year's mining operations was the shipment of 117 million long tons of iron ore —a 20 pct jump over the 1952 figure of 97 million tons, Bureau of Mines estimated.

Output of domestic ferroalloys also increased substantially in most fields except cobalt, the summary shows. Tungsten output from domestic sources exceeded consumption and permitted increased shipments for the stockpile.

On the other hand, production of nonferrous metals continued to soften. Copper output remained

Hit Peak in '54

at about 1952 level but domestic zinc production hit the lowest point since 1938.

Lead production dropped back by 50,000 tons under last year's output. And under competitive pressure from imports, production of antimony from domestic sources just about stopped.

Coke Up, Coal Down

Coke production last year is estimated as just short of 80 million tons—up 16 pct from 1952.

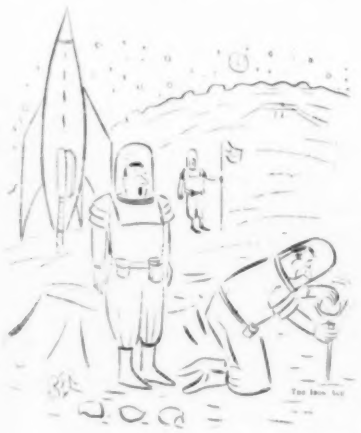
More than 1000 new ovens went into production during the year, the Bureau notes, but since a substantial portion represented replacements, net gain in capacity was held to about 4 million tons.

Bituminous coal and lignite production continued to decline, falling about 4 pct or 17 million tons, with 1953 output placed at around 450 million tons.

Under the government's purchase program, domestic manganese production increased materially to 160,000 short tons with new marks being chalked up for imports, consumption, and stocks.

Production of molybdenum remained at about or a little below 1952 levels, although output during the last half actually exceeded the peak 1943 rate.

Domestic production of bauxite remained at about 1953 rates, about 1.6 million tons, as imports rose to a total of 4.5 million long tons—up by 1 million from 1952.



"Now that you've claimed all mineral rights, how are you going to get the stuff back?"

...How about Malleable?

Make Your Products Tough... Durable... Safe

The ability of malleable iron castings to stand up under impact and shock plus their resistance to atmospheric corrosion make them exceptionally valuable for products that must be rugged and durable.

Malleable's excellent machineability and ability to be cast close to final form greatly reduce machining costs. Take advantage of malleable's product-improving, cost cutting properties. Call a malleable foundry and go over your products with their engineers. Find out how their skill in designing and producing malleable iron castings makes better parts at lower cost.

This Extension Ladder Hook was hammered out of shape to show how tough malleable iron withstands severe impact and distortion without breaking, assuring safe operation of critical parts.

Send for "Malleable Iron Facts", useful information on malleable iron properties and uses. Just write to Malleable Founders Society, Union Commerce Building, Cleveland 14, Ohio.

Malleable FOUNDERS' SOCIETY

1800 Union Commerce Building Cleveland 14, Ohio

MERGER: Doesn't Solve All Problems

Nash, Hudson executives still have major administrative job to make new American Motors efficient . . . Advantages are obvious, but some big problems remain—By *R. D. Raddant.*

For officials of the merger-born American Motors Co., the work has just started. The big job of welding Nash-Kelvinator and Hudson into a solid, aggressive organization capable of taking over a strong fourth place in the industry remains to be done.

Details of the merger are now well known: Stockholders of each organization will decide in March whether to approve merger of corporate assets of more than $355 million and working capital of more than $100 million. It will be on the basis of one share of Nash-Kelvinator stock for one share of American Motors and three shares of Hudson stock for two of the new company.

Big Job Still Ahead

Under the plan, Nash, Hudson and Kelvinator will operate as separate divisions of American Motors with dealer and sales organizations retaining their separate identities.

Obvious advantages are pooling of executive abilities, research and engineering services, purchasing power, reduction of administrative charges, greater diversification, and spreading of tooling costs. But there is a major administrative job which must be done well and efficiently before advantages will materialize.

While Nash and Hudson are currently suffering from the pangs of trying to compete with their larger rivals, they are still solvent and going concerns. There is no reason why the job can't be done.

There are also some obvious disadvantages of the consolidation of these two particular companies, applying only to the automotive sections, not to Kelvinator which can continue on its own profitable course in appliances.

Not All Gravy

For one thing, there may be too much competition between lines. The Nash Ambassador is competitive in price with the Hudson Hornet and the Nash Statesman with the Hudson Wasp. Hudson Jet and Nash Rambler appear to be compatible, but there will probably be some product realignment to obtain best results.

Another difficulty is the distance between Nash plants in Wisconsin and Hudson plants concentrated in Detroit. Best results from combined tooling require closer geographic locations, although this is far from insurmountable.

The combination can be as integrated as any in the automotive field. It will have 16 plants which will include 3 body plants, complete engine manufacturing facilities and assembly plants as well as foundry and forge facilities. It should be able to manufacture many of its major parts.

Not Big Four Yet

George W. Mason, Nash-Kelvinator chairman and president, will have this job as president of the new company. A. E. Barit, Hudson president, will serve as director and consultant.

Although the merger will place American in fourth place in the industry, it has a long way to go before it becomes one of a big four. General Motors production in 1953 reached 2,799,615, Ford 1,541,518 and Chrysler 1,246,602 vehicles. Nash produced 133,822 and Hudson 75,341 for a total of 209,163 cars.

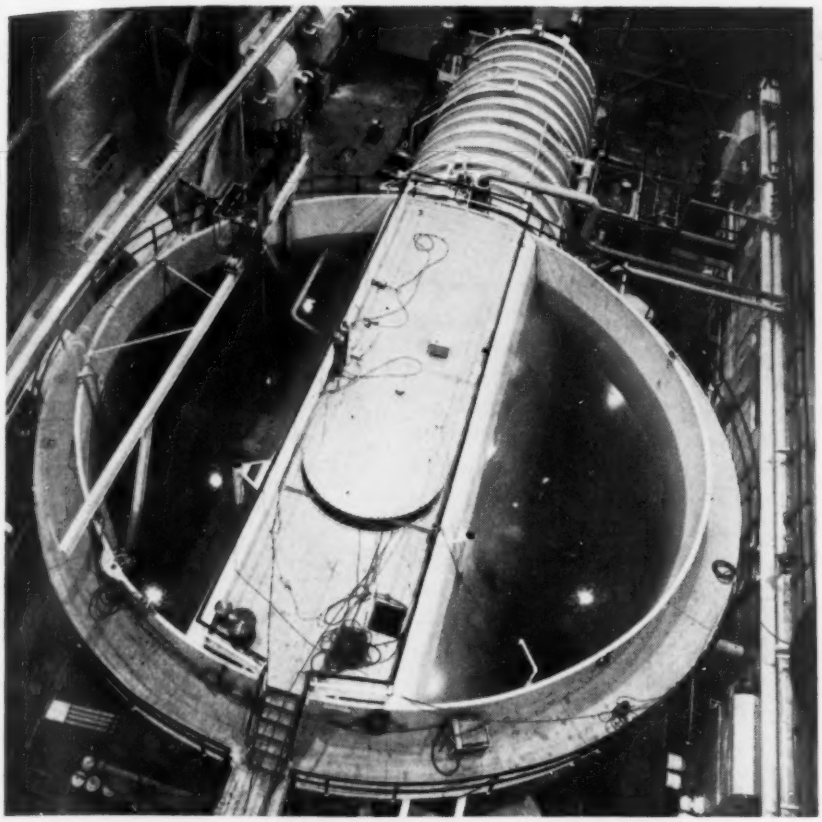
This leaves Studebaker and Packard alone among the independents without some consolidation plans. Packard has stated it is susceptible to merger offers but Studebaker has never indicated it is anything but satisfied with its independent status.

ELECTRONIC TRANSLATOR developed by International Business Machines Corp. Message fed into the "brain" in one language is translated into another language.

Industry Research Spending Up

Industry is readying its competitive tools and putting larger emphasis on research to develop new products, improve the old ones. Bearing out this trend is a report by Armour Research Foundation of Illinois Institute of Technology that value of industry sponsored research rose 39 pct in the first quarter of the fiscal year beginning last Sept. 1. This is compared to the same period in 1952-53.

Meantime, government-sponsored research remained relatively unchanged, said Dr. Haldon A. Leedy, Foundation director. Total volume of research business for the Foundation for the first quarter was $2,463,000 against $2,231,000 for the like 1952-53 period.



SUBMARINE hull houses first atomic submarine engine. Thermal reactor is near duplicate of one which powers the Navy's Nautilus.

Atomic Sub:

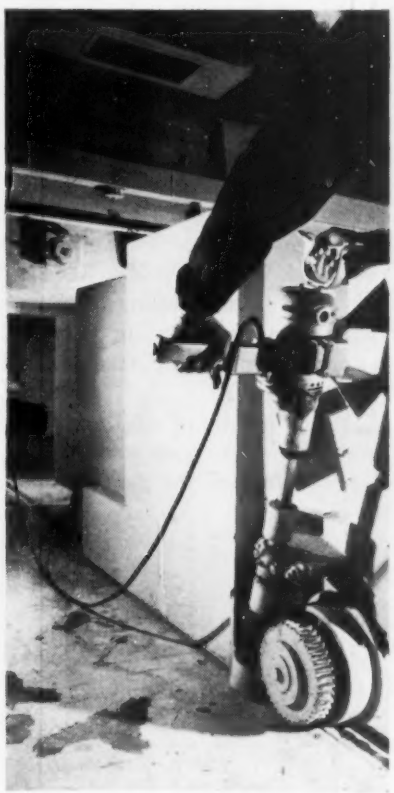
Nautilus launched . . . Engine tested at unique station.

The desert may seem an odd place to test a submarine engine but that's just what happened at Arco, Idaho. First propeller shaft ever turned by atomic energy was driven last May 31 by the Westinghouse-built reactor that served as a model for the one powering the Navy's first atomic sub, *Nautilus*, which is being launched today at Electric Boat Div., of General Dynamics, Groton, Conn.

Picture at upper left was taken in the main building at the test site. The large sea tank is about 50 ft in diameter, almost 40 ft high. Sub's hull passes through this tank so that the reactor compartment is completely submerged. Other photos show some of the protection measures taken to prevent undue exposure to "hot" materials.

Because the *Nautilus* does not need oxygen for fuel combustion, it can stay submerged for much longer periods.

MANIPULATOR is operated by technician behind 7-ft thick concrete wall.



DOOR weighs 4 tons, needs electric motor for closing. Another weighs 25 tons.

MECHANICAL hand is used for handling radioactive material at reactor test site.

Ike Asks Broader Social Security

Would extend coverage to 10 million additional people . . . Would also permit retired to earn more without losing benefits and raise payments, base—*By R. M. Stroupe.*

Apparent intention of Congress to modify the Federal Social Security program this year now has White House approval, provided fundamental rules of the system are kept intact.

In the judgment of President Eisenhower, the foundation principles are these: (1) The system is contributory, demanding payments by both employer and employee and (2) benefits accruing to those covered show a relationship to earnings. He finds these concepts commendable.

Protect Against Hazards

In a special Social Security message, the President evaluated private savings and pension plans, groups savings, and insurance as "primary means of protection against the economic hazards of old age and death." In addition, he said, there's a need for a "government social insurance system," making obvious reference to the Old-Age and Survivors' Insurance (OASI) portion of the Social Security set-up.

What Eisenhower Wants

As expected, Mr. Eisenhower reiterated his request of last August that OASI be extended to some 10 million additional persons, with emphasis on the self-employed. Among the groups he would bring into the system are doctors, dentists, other professional men, farmers, and nearly 4 million state and local government employees—this last category on a voluntary basis.

Further recommendations in the message included:

(1) Abandonment of the present rule that a retired person must lose his OASI benefits for any month in which he earns more than $75. Mr. Eisenhower would permit annual earnings of $1000 without penalty and deduction of only a single month's benefits for each $80 earned in excess of $1000.

(2) Increased OASI payments to retired workers, the payments to be based on a new formula to be submitted to Congress by the Health, Education, and Welfare Dept.

(3) Raising of the earnings base on which Social Security payroll deductions are calculated from the present $3600 to $4200. This would require a maximum annual contribution of $84 each by the employer and employee.

(4) Computation of average wages (in determining retirement benefits) by a method allowing the four poorest years of individual earnings to be ignored.

Early Action Expected

Mr. Eisenhower also proposed a new formula be worked out to decide the extent to which the Federal government should share the costs of state-run programs of public assistance.

Bills to implement the Eisenhower recommendations were introduced at once by Rep. Daniel A. Reed, R., N. Y. Mr. Reed says his Ways and Means Committee will open hearings on Social Security later in this session, probably in March.

Many members of Congress in both major parties are favorably inclined toward the general tone of the White House proposals. Arguments may become heated only over the extent and mechanics of changes in the law.

Contracts Reported Last Week

Including description, quantity, dollar values, contractor and address. Italics indicate small business representatives.

Boat davit and winch, 24, $227,291, Welin Davit and Boat Div., Continental Copper and Steel Ind., Inc., Perth Amboy, N. J.

Non-magnetic high strength type dielock chain, 520, $315,640, Baldt Anchor, Chain & Forge Div. of Boston Metals Co., Chester, Pa.

Non-magnetic high strength type dielock chain, 450 $190,237, St. Pierre Chain Corp., Worcester, Mass.

Portable X-ray machine, 4, $69,649, Triplett & Barton, Inc., Burbank, California.

Ventilation heater, 3425, $127,293, McIntyre Engineering Co., Inc., South San Francisco, California.

Landing craft, mechanized, 150, $64,832, McIntyre Engineering Co., Inc., South San Francisco, California.

Class A fuel oil pump governor, 192, $89,267, Leslie Company, Lyndhurst, N. J.

Rotor high pressure completely bladed ? low pressure, 2, $98,979, General Electric Co., Washington, D. C.

Shelving, steel, olive green finish, 2 lots, $110,065, General Steel Products Corp., 32 West 25th St., Baltimore, Md.

Trucks, fork lift, gasoline, 20, $130,275, Gerlinger Carrier Co., Lyle and Birch Streets, Dallas, Oregon.

Head, molded, 35000, $87,702, Waterbury Companies, Inc., Waterbury, Conn.

Adapter compasses, 251, $354,057, Arma Corporation, Garden City, L. I., N. Y.

Cylinder, ignition, portable flamethrower, 190000 ea, $169,996, Kilgore, Inc., Westerville, Ohio.

Trucks, 62 ea, $144,910, Ford Division of Ford Motor Co., N. W., Washington, D. C.

Light trucks, 392 ea, $469,023, General Motors Corp., Chev. Motor Div., Detroit, Mich., *G. M. Haley.*

Light trucks, 302 ea, $244,176, Ford Div. Ford Motor Co., N. W., Washington, D. C.

Trucks light, 130 ea, $185,279, Willys-Motors, Inc., Toledo, Ohio.

Laundry equipment, 11 ea, $106,965, United States Hoffman Machine Corp., N. Y.

Laundry equipment, 9 ea, $76,741, Troy Laundry Machine Div., American Machine & Metals, Inc., East Moline, Illinois.

Hepenstal Takes Over Cataloging

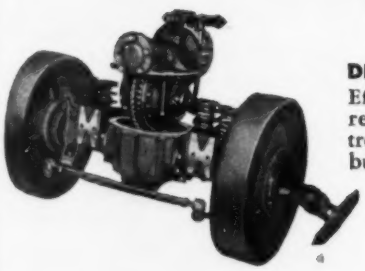
Making a single supply cataloging system work effectively for the national military establishment is a primary responsibility of Roger F. Hepenstal, New York businessman who recently was named to an important Defense Dept. logistical post.

With the title of Director of Cataloging, Standardization, & Inspection, Mr. Hepenstal will be concerned with policies and programs applying to the three activities named. He has the task of reducing the number of specifications for those items used by all the military services.

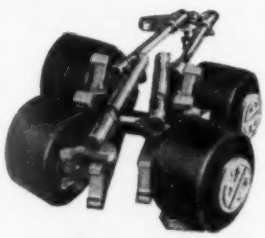
each of 16 ELWELL-PARKER ten-year-olds averages only 1 hour per month maintenance!

The fleet of Elwell-Parkers at Jack & Heintz, Inc. frequently operates on a 24-hour-per-day-basis. Since no high tiering is involved, *low lift platform* trucks are used. They are lighter than comparable fork models. Floor maintenance is thus reduced. Their short length and short turning radius (all wheels steer) make them extra maneuverable in close quarters.

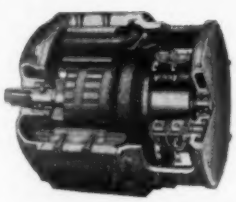
some plus values of E-P trucks that explain this remarkable record:



DRIVE AXLES
Efficient, silent worm reduction units of heat-treated alloys. Ruggedly built and easily serviced.



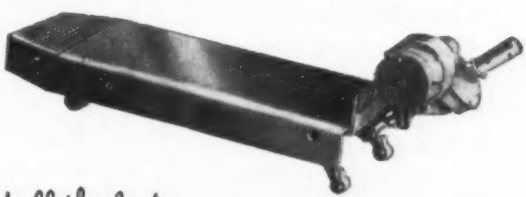
TRAIL AXLES
Fully articulating steering axles assure longer tire life. Dust-proofed, anti-friction bearings in steering rods and wheels reduce maintenance—make steering easy.



MOTORS—E-P BUILT
Practically indestructible and fireproof. Armature coil-commutator connections are *brazed,* not soldered. Double brushes mean more current capacity and less wear.

"ROLOTAC" CONTROLLER
Provides exact truck control, because trigger snap and sliding action assure instant make or break — eliminate arcing. All contact fingers and their parts are interchangeable.

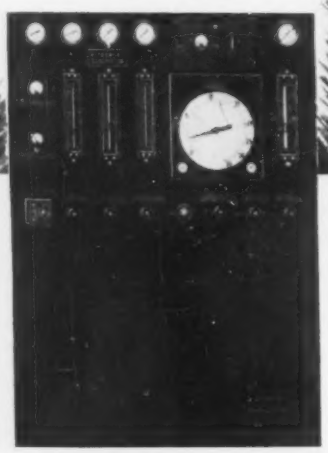
LIFT JACK—A simple mechanism—3 moving parts—worm, worm wheel, and ram, protected by overload slip clutch.



get all the facts Send for General Catalog that describes 150 models. Write The Elwell-Parker Electric Co., 4294 St. Clair Ave., Cleveland 3, Ohio.

ELWELL-PARKER
POWER INDUSTRIAL TRUCKS
Established 1893

FURNACE BRAZING OF STAINLESS STEEL



NITRONEAL GAS GENERATOR

. . . Produces pure nitrogen with a controllable hydrogen content that can be varied at will and maintained at any percentage from .25% to 25% to best suit work in furnace.

Used for bright annealing, heat treating, and furnace brazing of stainless steel, low and high carbon steels and non-ferrous metals.

- Fully Automatic
- No Operating Personnel Required
- No Explosion Hazard
- 30% Less Costly than Dissociated Ammonia.

Units available in 100 C.F.H. to 10,000 C.F.H. capacities.

Write for Booklet No. 21

BAKER & CO., INC.

113 ASTOR STREET, NEWARK 5, N. J.

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Industrial Briefs

Mill Started . . . VANADIUM CORP. OF AMERICA has started operation of a new mill for concentration of eluvial and metallurgical grade chromium ore from the properties of the corporation in Southern Rhodesia.

Exclusive Rights . . . ST. PAUL HYDRAULIC HOIST, Minneapolis, has appointed Chicago Hoist & Body Co., Chicago, as its representative.

Transfer . . . Silicone Products Dept. of GENERAL ELECTRIC CO. has transferred its Technical Service Unit from its Engineering Section to the Marketing Section. John T. Castles is manager of the Technical Service Unit.

Changes Name . . . RICHMOND STEEL CO., INC. is the new name of the Richmond Structural Steel Co., Inc., Richmond, Va.

Voting . . . Stockholders of American Metal Products Co., Detroit, and Tube Reducing Corp., Wallington, N. J., have been submitted plans to merge the two companies, and proxy voting forms have been mailed out.

25th Anniversary . . . Directors of HANSON-VAN WINKLE-MUNNING CO., Matawan, N. J., presented President Louis M. Hague with a gold watch and a silver candelabra from the corporation commemorating 25 years with the firm at a dinner last month in New York.

Scholarships . . . THE BRISTOL BRASS CORP. will give scholarships to its employees and their sons and daughters through the Bristol Brass Foundation, Inc.

Established . . . COLONIAL BROACH CO., Detroit, has established a West Coast manufacturing affiliate, Colonial Western Broach Co., Los Angeles.

Buys Land . . . DRAVO CORP., Pittsburgh, has purchased a tract of approximately 60 acres along the Ohio River at Leetsdale, Pa., for possible future use in expanding facilities.

Moving Soon . . . THE INVESTMENT CASTING CO. is moving to new quarters at 60 Brown Ave., Springfield, N. J., next month, and will offer larger and better facilities to its customers.

Foreign Rights . . . EATON MFG. CO., Cleveland, has acquired foreign rights to the Jacob Rabinow patents. The patents cover certain aspects of the principle of using powdered iron as a magnetic medium.

Expansion Program . . . COLUMBIA STEEL & SHAFTING CO. has completed a half-million-dollar modernization and expansion program at its Carnegie, Pa., plants.

Metalworking Plant . . . THE PERMUTIT CO., New York, is building a modern metalworking plant in Lancaster, Pa., to be completed in the spring.

First Step . . . WESTINGHOUSE ELECTRIC CORP. will spend more than $2.5 million to rearrange and expand its Appliance Div., Mansfield, Ohio, as the first step in a program to approximately double production of several major appliances and substantially increase production of portable appliances.

Distributor . . . National Alloy Div., BLAW-KNOX CO., Pittsburgh, has appointed the Metallurgical Products Co., Brookline, Mass., to distribute its products in New England.

Earnings Reported . . . ARTHUR G. McKEE & CO., Cleveland, reports its net profit is estimated at approximately $2,520,000.

Established . . . ARMCO DRAINAGE & METAL PRODUCTS INC., Middletown, Ohio, has established a graduate scholarship for soil moisture research in the Cornell School of Civil Engineering.

Honored . . . NATIONAL STEEL CORP.'S Ernest T. Weir, Chairman, was honored recently as Western Pennsylvania's outstanding Industrialist for 1953, by the Western Pennsylvania Chapter of the Society of Industrial Realtors.

Still Chairman . . . ENGINEERING MANPOWER COMMISSION of Engineers Joint Council reports that Dr. T. H. Chilton, technical director, Engineering Dept., E. I. du Pont de Nemours & Co., Wilmington, Del., will continue as chairman during 1954.

IT WILL PAY YOU TO LOOK INTO REVERE'S 70-30 BRASS TUBE— *it paid SCHAIBLE!*

Model #922—Schaible Faucet Assembly with Hydramold Spout. To date more than 1,000,000 Hydramold Spouts have been produced, and not one single failure reported from the field.

Close-up of Schaible Hydramold Machine (Patents Pending): Operation of this machine requires no special skill of the operator. One or any number of workpieces respond to accuracies of a thousandth part of an inch. Wall thickness of spout is uniform, nonporous, without inclusions, seams or joints.

A brass that does not have to be "tailored" to a job, but is made with accuracy in normal mill procedures, meets the unusual material requirements that the Schaible Company has in its remarkable spout fluid forming process called Hydramold.

The Schaible Company, Cincinnati, Ohio, is one of the larger manufacturers of strainers, valves and faucets, who have been more progressive in product design and methods of manufacture. Schaible requirements are exacting as to product quality control. This is especially true of sources of material, and when the company developed, designed and built its four new Hydramold machines to manufacture modern spouts from tubular material, the specifications became most rigid.

This was where the Revere Technical Advisory Staff entered the picture. Revere technical men studied the Hydramold process developed by Schaible engineers, and the unusual forming requirements, thereby helping establish the exacting specifications so that the mill and manufacturer developed mutual material control and process information.

The Schaible Company has made more than one million spouts by this new method without a single field performance failure—better spouts, states Schaible, produced by more economical means than conventional casting methods.

Today, there may be more costly spouts, but according to Schaible "There is no better spout than the Schaible Hydramold formed spout."

This case study is another example of the value of close cooperation between Revere and an exacting customer. The more we know about what you make, and how you make it, the better we can serve you. See the nearest Sales Office.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

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• • •

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.— Sales Offices in Principal Cities, Distributors Everywhere.

SEE "MEET THE PRESS" ON NBC TELEVISION, SUNDAYS

Changes Hit Industry on All Fronts

Merger, dealers' revolt, technical developments, new models keep automakers on jump . . . NADA asks limit on factory shipments . . . New Olds, Cadillac shown—By *R. D. Raddant.*

It's doubtful if the auto industry ever concentrated so much frenzied activity on so many fronts into one period of time as in the 2 weeks of mid-January.

Birth of American Motors Co. by Nash-Hudson merger, threatened rebellion of National Automobile Dealers Assn. in Miami Beach, annual pooling of technical developments by the Society of Automotive Engineers in Detroit,

For details and comment on last week's Nash-Hudson merger, see p. 46.

first gas-turbine-powered car, and opening of the 1954 General Motors Motorama in New York were the main events.

Dealers Protest . . . Added to these were major new car announcements, layoffs and other signs of trouble in some segments of the industry, some startling figures on used car dealers and used car prices, and a dozen other automotive developments of lesser importance which kept the industry in an ulcer-provoking dither.

Gist of the NADA convention, regardless of what final form its resolutions take, is an attempt by many dealers at organized resistance to factory shipments if they are in excess of what the dealers believe may be sold at a reasonable profit.

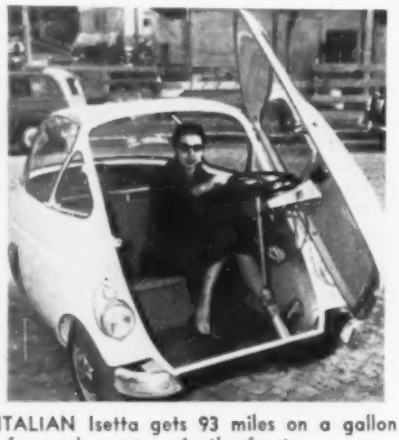
This is in spite of official word from almost every manufacturer that his company will ship only what his dealers order. What this boils down to is a general difference of opinion on what number of cars is good for the dealer and what is good for the parent company.

Used Prices Drop . . . Generally speaking, the dealer side of the industry believes that the market potential is between 4.5 and 5 million while the manufacturers are gearing production at a rate of 5 to 5.5 million. Dealers fear that an excess will bring on more price cutting and make it more difficult to solve the used car problem, which now may be called the top headache of the industry.

Speaking of used cars, the official publication of National Used Car Dealers Assn. reports an estimated 25 pct reduction in the number of used car dealers in 1953 as well as a drop of 42 pct in used car prices.

Olds, Cadillac Introduce . . . The new car lineup was virtually completed this week with Oldsmobile and Cadillac the last of the major producers to come into the market. (Willys and Kaiser are not yet out.)

Along with Buick, Olds and Cadillac constitute the three GM divisions that have completely restyled cars this year. Their stylings also show the GM concept of basic bodies. Oldsmobile has the so-called B body, Cadillac the C body, and Buick B bodies in its two smaller series and C for its top cars.



ITALIAN Isetta gets 93 miles on a gallon of gas, door opens in the front.

While the Olds and Cadillac are completely different cars, the direction of their styling changes is strikingly parallel. This is logical, however, since they are both GM cars and changed to about the same degree.

Show Experimental Influence . . . For example, the Olds is 3 in. lower and 2 in. longer while the more dignified Cadillac is 3 in. longer with the car height lowered about 1¼ in. Both have entirely new frames and were restyled from the frame up. Both have the GM Panoramic windshield, but with the Olds corner post angled forward while the Cadillac's is vertical.

Both also took much of their new styling from last year's experimental cars, the Olds Starfire and the Cadillac LeMans. This is most apparent in the Cadillac grille which is made of finely spaced cellular construction with a vertical front line.

Both Oldsmobile and Cadillac convertible and coupe models have a sports styled, swept down front window line. Both have employed trim and bumper construction to accentuate the longer and lower construction.

Pushed Up 1 Year . . . Mechanically, horsepower in the Cadillac is increased to 230. In the Olds 88 it is 170 and in the Super 88 and 98 series it is 185. The Cadillac also has a 1 in. wider tread in addition to its longer wheelbase. Its engine is 2 in. lower, straightening out the drive line.

Olds officials have stated that this particular car was not really scheduled until 1955, but at their insistence it was pushed ahead to 1954, a major engineering accomplishment.

Cadillac has just about reached the peak in luxury features. Auto-

matic transmission was standard previously, but this year power steering is also standard in all lines as is a window washer and wiper coordinator. In some Cadillac lines automatic seat and window lifts are also standard equipment. In both cars interiors and exterior finishes were improved and Cadillac in particular introduced a number of features designed to smooth out the ride and cut down mechanical noise.

Stress Seat Comfort . . . Technical sessions at the SAE meeting indicate that more importance is being given to seat design to provide both driver and passenger more riding comfort. It also appears that a mild debate is in the offing between advocates of designing a seat for a mythical average driver and improving seat adjustments for individual preference.

Ford Motor Co. uses "Oscar," a dummy of average size in determining seat contours. Oscar is 5 ft 9½ in. tall and weighs 165 lb. From studies, it was determined that Oscar should slouch an average of 1° to correspond with the position of the average driver.

In seat research Ford uses a load deflection machine, a fixture for checking pressure distribution, natural frequency and dampening characteristics of the cushion, and fatigue tests of the cushion.

Oscar Isn't Female . . . But a spokesman for a company that has developed a universal positioning seat track used as optional equipment this year in the Pontiac challenges Oscar to a certain degree. F. C. Matthaei, Jr., of American Metal Products Co., points out for one thing that Oscar is not the average woman.

Furthermore, tests conducted with their seat track indicate that a person's likes and dislikes have a greater bearing on his seating position than his physical dimensions. They also showed that individual preference in the seat angle ranged from 11° to 17° although the production seat is 15°. About 75 pct of persons surveyed positioned the seat higher than is afforded in the present fore and aft track.

It is also known, although not reported officially, that GM is working on the angle and position of the steering wheel and column, possibly toward a future adaptation in which this is adjustable as well as the car seat.

Detroit Notebook

There is no pessimism in GM and a lot of optimism in several divisions. Cadillac, Buick, and Oldsmobile division heads have all predicted their biggest year in 1954.

Edgar Kaiser now reports that the reorganized Kaiser-Willys will concentrate on the established utility products, the Jeep and its family of vehicles, as the bread and butter product. He concedes that the short-lived Henry J may become an "orphan."

Plymouth is now offering factory-installed Continental Conversions, or rear mounted spare wheels and tires. The wheel is mounted on a springloaded arm which lifts the spare out of the way when released by the driver for easy access to the trunk.

Latest experimental car is Dodge's Granada, the first one-piece all plastic body car developed by the industry on a conventional chassis. The car is not intended for production, but only for show and experimental purposes.

Studebaker has forestalled laying off of 3000 production workers by keeping 32-hour, 4-day week shifts at South Bend. This avoided a serious labor squabble over seniority.

Ford Motor Co. has disclosed plans for a desert proving ground in Arizona, purchasing 4000 acres in Mojave county.

Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
Jan. 16, 1954..	123,007*	26,464*
Jan. 9, 1954..	125,622	26,796
Jan. 17, 1953..	118,110	29,939
Jan. 10, 1953..	109,880	29,740

*Estimated. Source: *Ward's Reports*

THE BULL OF THE WOODS By J. R. Williams

TH' GALL OF SOME PEOPLE! TH' VENEER CAME LOOSE FROM TOO MUCH SITTIN' AND LEANIN' ON IT, BUT THIS GUY DON'T TAKE TH' HINT--HE GOES TO BED ON IT WHILE TH' CARPENTERS ARE WORKIN' ON IT!
YOU CAN NEVER LIVE DOWN YOUR PAST! THE BULL OF TH' WOODS WAS A CHAMPION SITTER AN' LEANER ON MACHINES HIMSELF ONCE--AND A FEW WHO REMEMBER IT ARE HARD ON HIS DIGNITY!
J.R.WILLIAMS
1-22
FAMILIARITY
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In addition, Texaco Lubrication Engineering Service can be of valuable assistance to you. To secure this service, just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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TUNE IN . . . METROPOLITAN OPERA radio broadcasts every Saturday afternoon. See newspaper for time and station.

More Tax Reductions May Come Soon

Would place more spending money in hands of consumers . . . Regarded as anti-recession weapon . . . May raise contract renegotiation maximum to $500,000—*By G. H. Baker.*

Tax reduction, the top-drawer tool in the Eisenhower Administration's kit of anti-recession implements, is being honed for action on Capitol Hill this week. Election-conscious members of both parties are meeting daily behind closed doors in a detailed effort to write an effective tax-reduction program that will place more spending money in the hands of consumers and, as a result, pump new life into lagging sales areas.

Although anti-recession plans, just like tax plans, still are a long way from assuming any definite pattern, it is now clear that reduction of some consumer excises, a "bonus" tax cut for individual wage-earners, and rapid amortization of new plant and equipment stand a better-than-even chance of being voted into law by July 1.

These tax "breaks," if they win final approval in Congress, will be in addition to the lower excise rates on automobiles, automotive products, gasoline, and other products that are scheduled to become effective on Apr. 1. Talk of postponing these reductions until a later date is rapidly dwindling.

Change Renegotiation? . . . Legislation to renew the Federal Government's contract-renegotiation authority—retroactively to Jan. 1—appears headed for congressional approval, but not without a hot battle of debate over new terms under which contractors must return part of their fees to the government.

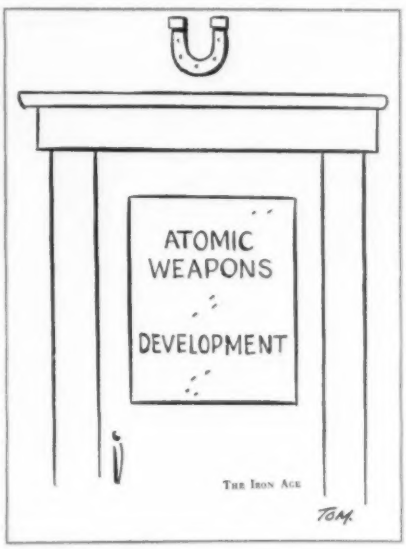
Under the provisions of extension legislation now before the Senate, two important changes affecting defense contractors and subcontractors are proposed. One of these changes increases from $250,000 to $500,000 the minimum amount of earnings subject to renegotiation. The $500,000 figure would apply to the fiscal year ending June 30, 1953. The second amendment would exempt from renegotiation all stock items (standard commercial articles).

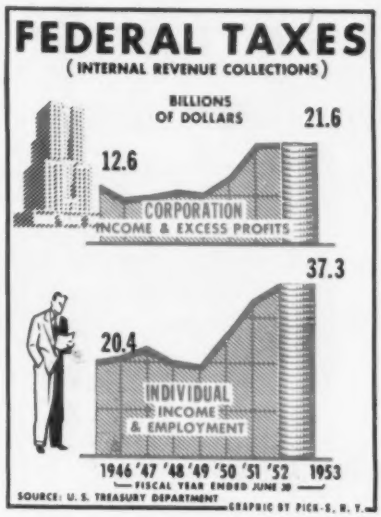
Chairman Millikin, R., Col., of the Senate Finance Committee, estimates that increasing the minimum renegotiable amount to $500,000 will cut the workload of the Renegotiation Board by 25 pct.

The House last year approved a 1-year extension of the renegotiation law, despite protests from the Machinery and Allied Products Institute.

Boost Draft Rate . . . Army draft rate, which has been jogging along at the rate of 18,000 men every month for nearly a year, is slated to jump sharply in the months ahead. Impact upon industry, particularly among younger workers, will begin to be felt by July. Draft calls in that month are to jump to the 28,000-30,000 mark.

Step-up in the draft rate actually is going to result in a smaller, not larger, Army. Men drafted after the start of the Korean war are completing their 2-year hitches. Few of them are electing to remain in service. Result: Even to maintain an Army of 1 million men, it may be necessary to draft as many as 30,000 men monthly starting next July.



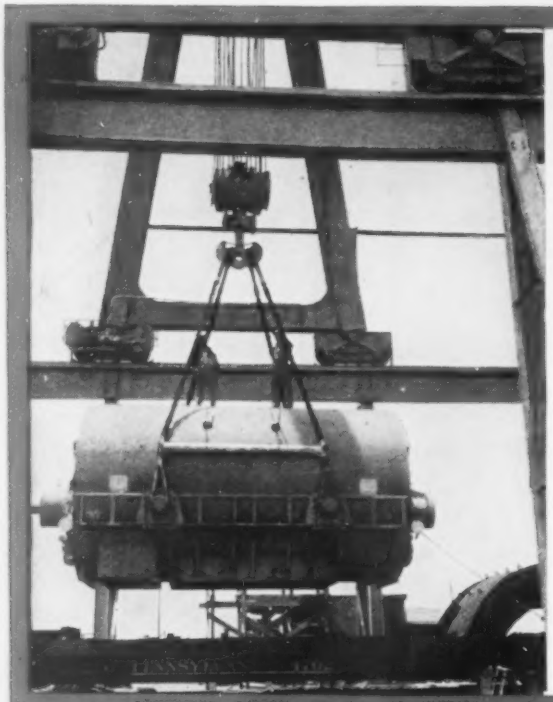


Report Conservation . . . Prime contractors supplying goods and services to the military departments now are required to submit "narrative reports" to tell Assistant Defense Secretary Charles S. Thomas how well they are conserving materials.

These reports go originally to the cognizant military service, which twice per year must submit its own detailed report on materials conservation to Mr. Thomas, the Pentagon logistics chief. Departmental and contractors' "narratives" are to reach him within 60 days following June 30 and Dec. 31 of each year.

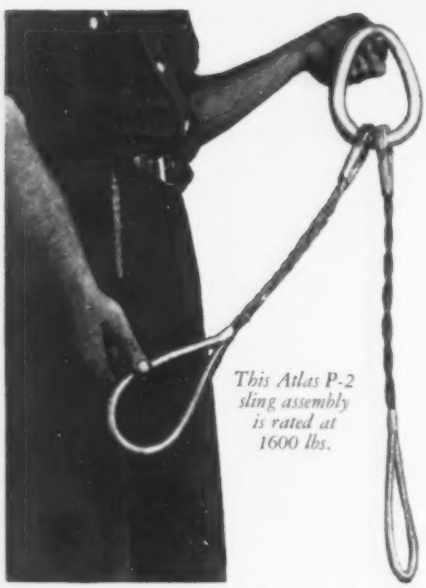
Contained in the contractors' reports will be information on such matters as identification of the material involved, end-item being made, description of the conservation measures used, and an estimate of the amount of material saved during a specified half-year.

Purpose of the reports, Mr. Thomas says, is to inform Defense Dept. whether maximum military preparedness is being provided at minimum monetary cost and least demand on U. S. resources.



Another job well done with Macwhyte Slings!

408,600-LB. GENERATOR SAFELY HANDLED WITH MACWHYTE ATLAS BRAIDED SLINGS



This Atlas P-2 sling assembly is rated at 1600 lbs.

Macwhyte slings are available for any load regardless of size. Our experience on thousands of applications is yours for the asking. Just write to Macwhyte Company, Sling Dept., Kenosha, Wis.

Macwhyte 8-Part Atlas Type 1 Round-braided Wire Rope Sling.

Safe installation of a $2,000,000 generator at the Valley Steam Plant of Los Angeles' Department of Water and Power required expert handling and finest rigging.

That's why Macwhyte Atlas Round-braided Wire Rope Slings were chosen to unload and install the largest and heaviest single freight shipment ever handled by the Southern Pacific Railroad. Lift was made with a 180-ton Moffett Crane using Macwhyte's Monarch Whyte Strand Wire Rope.

Macwhyte's *balanced* braiding gives Atlas Slings greater flexibility, longer life, resists spinning and kinking. Macwhyte slings and wire rope offer better service on any lifting job, large or small. Recommendations will be promptly made on request.

MACWHYTE SLINGS

Complete line of slings to fit your needs!

Three types of body are available: Atlas Round-Braided, Drew Flat-Braided, Monarch Single-Part. All are made to order in any size for any job. Suggestions for slings to meet your needs are promptly available.

READY now—new Circular Number 5308 showing strengths and safe-loads at various angles plus many sling designs. Ask for 5308.

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Wages:

Administration to drive for higher minimum pay scale.

Full support of the Eisenhower Administration may be expected to be thrown behind a drive for sweeping revision of the Fair Labor Standards Act.

One reason is that this is a leg of the 3-point labor program of (1) revision of Taft-Hartley Act, (2) higher minimum wage and fewer exemptions, and (3) guaranteed annual wage.

Seek Ways and Means

Since the White House has ignored labor's demand for broad revision of Taft-Hartley, the Administration feels it must press for new standards for the FLSA as a conciliatory move.

Labor Secretary James P. Mitchell virtually promised as much when he told the CIO that his department was seeking "ways and means to increase . . . minimums and exploring the possibility of bringing in additional workers."

A detailed outline of the changes wanted in the FLSA is slated to go to Congress on Jan. 28. Basic proposal will be to raise the present statutory minimum of 75¢ an hour.

Labor Asks $1.25

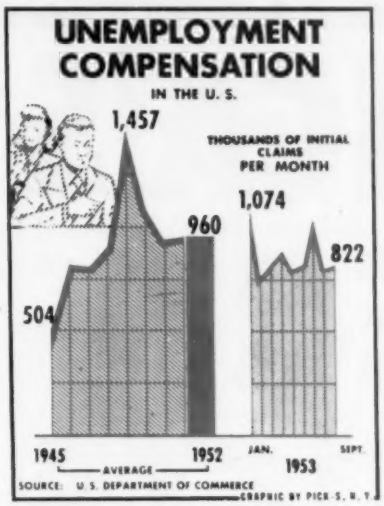
Labor itself has been urging that the minimum be boosted to as high as $1.25 an hour. Bills to this effect have been introduced and more will be presented.

What the Administration intends to recommend is being kept under wraps. But no one expects such a minimum to be asked by the White House.

Talk is that Secretary Mitchell would like to see a new minimum of about $1 an hour. Even if this is proposed, the White House would probably settle for a new minimum of 90¢, an increase of 15¢ over present wage floor.

It has been indicated by President Eisenhower that he will go along with Mitchell's plan for seeking increased coverage. Consensus is that recommendation will be made to include retail businesses, now generally exempt.

Trade representatives in Washington are getting set for a fight over this provision. Spokesmen say that this would not only have an adverse effect on employment but would also push wages up.



Building:

Expenditures hit record $35 billion in '53, says BLS.

It's now official. Expenditures for new construction during 1953 amounted to almost $35 billion.

So says the U. S. Bureau of Labor Statistics, which adds that this is the record amount both in physical and dollar volume racked up in the 39 years records have been kept.

Dollar volume for privately-financed construction at $23.7 billion was up 8 pct from 1952, while publicly financed building was up 4 pct to $11.2 billion.

Physical volume of new construction put in place was estimated to have increased about 5 pct over the previous year.

Only three categories showed a downward trend. With a major portion of defense expansion completed, industrial type construction receded slightly to $2.2 billion.

Rise in public construction expenditure is attributed largely to increased highway, school, military industrial facilities, and expansion of city water and sewer systems.

More than 25 pct of total public construction, about $3.2 billion, is charged off against highways. Cost of military industrial facilities increased slightly to $1.8 billion.

Taking a general look at the situation, BLS looks for a good construction year during 1954, barring some unforeseen emergency such as a big strike or something of the kind.

It cautiously and officially sees the 1954 construction volume at a little less than the 1953 level—perhaps $34 billion. Unofficially, the guess is $35 billion.

Supporting this view is the fact that industrial construction failed to slump heavily in last half 1953, although many of the expansion programs were near completion.

Also, there is no indication at the present time that commercial construction such as stores, garages, warehouses, etc., have reached the saturation point after being retarded during the war and later by partial defense mobilization since Korea.

A population trend toward the suburbs is helping bolster both housing and commercial building activity. Highway construction won't be less, may even increase.

Merchant Marine in Poor Shape

Outlook for U. S. merchant marine for the next year leaves much to be desired. During 1953, some 85 vessels of 1000 tons or over were withdrawn from the active fleet. Most of the drop, however, was in government-owned vessels. Four subsidized lines dropped out, leaving only 15 lines still drawing payments, and the active fleet now totals only 1384 vessels.

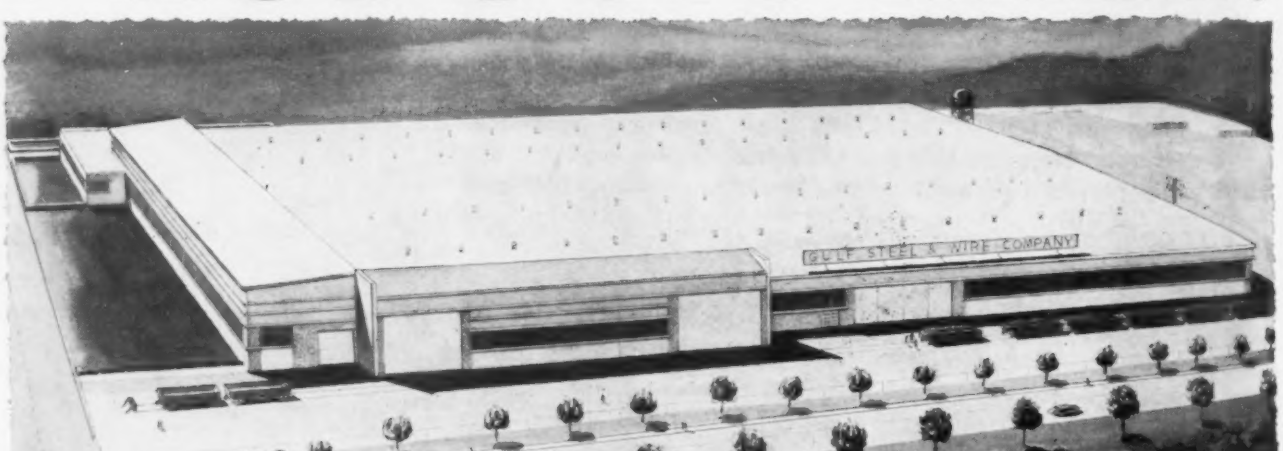
Check of building activity shows that only 45 oceangoing vessels are under construction in American shipyards.

Yards are building 14 Mariner type and two reefers for the government, 16 vessels for the American flag lines, and 13 for foreign lines.

Employment in private shipyards was estimated at about 116,500 on Jan. 1, a decrease of about 11,500 from last year.

Gulf Steel & Wire Co. Announces:

AMERICA'S MOST MODERN WIRE PRODUCTS MILL!



New buildings, *new* methods, *most modern* electronically controlled machinery of very latest design, manned by personnel thoroughly qualified by *many years* of experience!

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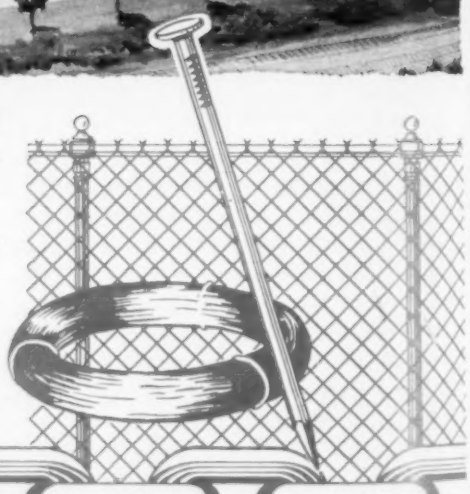

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8-06

BAYAMON 19, P. R., U. S. A.

Northwest Building Keeps Booming

Construction industry sees another record year in '54 . . . Private industry, utilities compensate for federal stretchouts . . . Spending should run $2.5 billion—By T. M. Rohan.

The construction boom in the Northwest and Alaska appeared last week headed for another record year in 1954 with private industry and utilities taking up the slack from government stretchouts.

Authoritative estimates indicated about $2.5 billion will be spent this year in Washington, Oregon, Idaho, Montana, Utah, Wyoming and Alaska to keep pace with the rapidly expanding population and economy. This $2.5 billion is at least equal to 1953 and probably somewhat ahead, promising good business for suppliers. Nationally construction this year is expected to dip by 2 to 4 pct.

General Building Heavy . . . Largest segments in the total for the area are general construction at $659 million, industrial construction at $430 million, Corps of Engineers including dams, $300 million and Atomic Energy Commission at $200 million. Total highway construction and maintenance comes to over $300 million divided between federal, state, county and Alaska—state highways leading at $164 million.

Washington, Oregon and Alaska having the bulk of population lead in budgets of $980 million, $529 million and $378 million.

$100 Million Private Power . . . Private power firms and municipally owned public utility districts taking up the slack of government dam construction have scheduled $100 million this year. Over $1 billion is planned if Federal Power Commission approval can be obtained on additional projects. Bonneville schedules call for $11 million expenditures on 11 substations, 51 miles of line clearing and 372 miles of transmission lines.

In Washington, refinery construction is booming as a result of the oil transmission pipeline from Edmonton, Alta. (THE IRON AGE, Oct. 8, 1953, p. 209). General Petroleum is building a $35-million unit at Bellingham and Shell is clearing land for a $75-million unit at Anacortes. Washington Process Co. will start a $10-million unit near Tacoma. Alcoa is in a $6.7-million expansion plus a $3.3-million extrusion mill just completed at Vancouver.

Anaconda's $50-million aluminum reduction plant at Columbia Falls., Mont., is that state's largest industrial project and a $20-million pipeline is under construction from Billings to Spokane. A pipe line from Williston Basin is under consideration.

Capacity Up Slightly . . . Rated steel ingot capacity of mills in the seven western states will increase only about 3 pct for 1954 over 1953, according to a check last week. Total rated capacity according to figures submitted to the American Iron and Steel Institute indicated new capacity will be 5,783,000 tons compared to 5,578,000 for 1953.

Increased ratings are based on improved mill performance.

"But I can't golf any lousier. How much is his darned account worth anyway?"

Japanese Win Job . . . U. S. electrical and hydraulic manufacturers have become resigned to losing occasional bids for Pacific Northwest power equipment to European builders. But last week the Japanese firm of Hitachi, Ltd., of Tokyo took one. The Japanese firm was awarded a contract for turbine governors for the Columbia river dam at The Dalles, Ore., for $1,073,522 or nearly a quarter million less than the lowest American bid of $1.3 million by Pelton Water Wheel Co. of San Francisco.

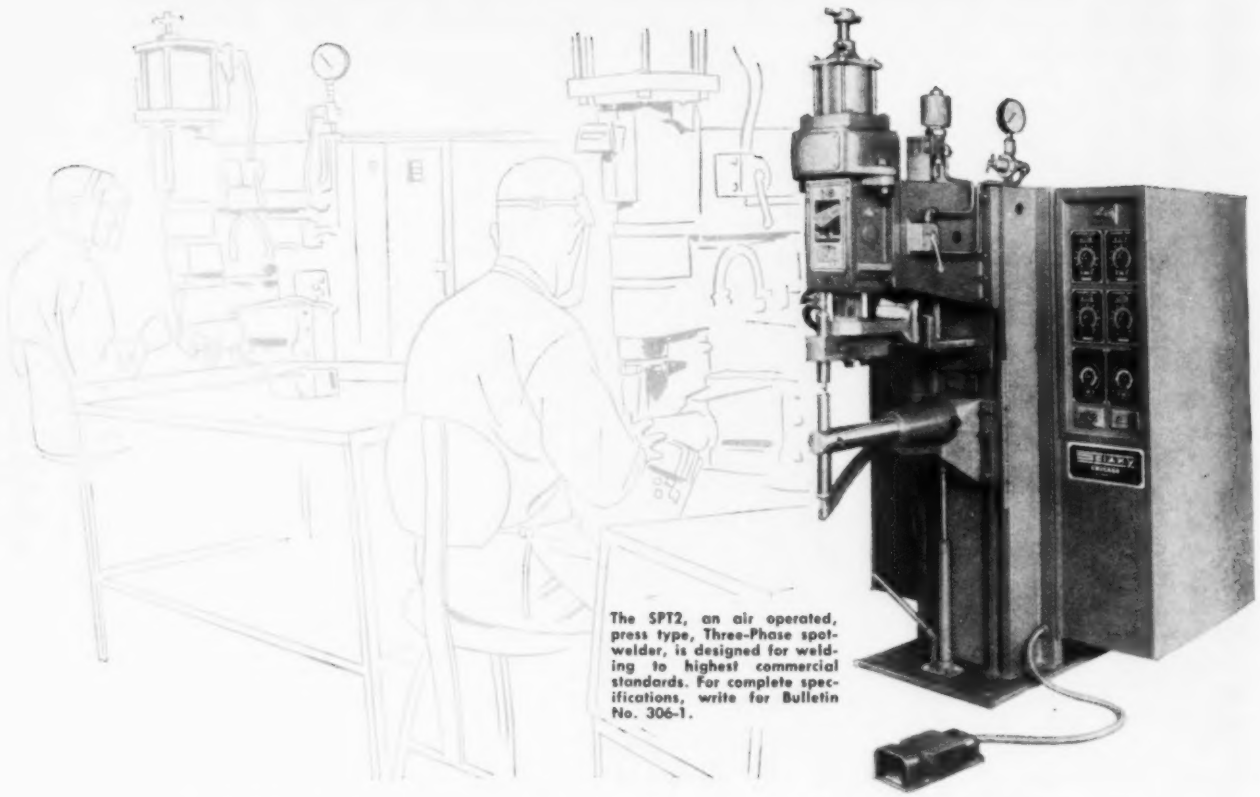
Westinghouse meanwhile was awarded a contract for $771,346 for a 230 kv autotransformer for a Bonneville Power substation in Wasco County, Ore., after lower bids by an Austrian and English firm were rejected for lack of experience. The Westinghouse bid has an escalator clause with top limit of $925,615 or 20 pct.

Tubing Sells Fast . . . Colorado Fuel & Iron Corp.'s new $30-million seamless tube mill last week added a third turn and is at least 3 months ahead of production goals. Sales of wire products are also picking up in the intermountain area in anticipation of Spring activity, confirming a slight pick-up in wire products sales in the Far West reported a week ago.

No Big Drop . . . Los Angeles business leaders last week saw at best only a slight dip in 1954.

Addressing a Chamber of Commerce Business Outlook Conference, Arthur E. Raymond, Douglas Aircraft Co., said his firm expects the present level of business in local aircraft industry will be held in the next year or two.

YOU CAN USE
STANDARD SPOT WELDERS
FOR SPECIAL APPLICATIONS



The SPT2, an air operated, press type, Three-Phase spot-welder, is designed for welding to highest commercial standards. For complete specifications, write for Bulletin No. 306-1.

Three Standard Sciaky Three-Phase Machines Simplify Complications of Welding Bumper Guards

Grand Rapids Metalcraft, a Division of F. L. Jacobs Co., consulted Sciaky about special machines for resistance welding two mounting brackets in automobile bumper guards. Definite requirements of strength, outside appearance, and production were complicated by limited power facilities.

After careful examination of the problems, Sciaky engineers adapted completely standard spot welders with simple tooling.

Sciaky patented Three-Phase Principle of operation with balanced line load, near unity power factor, and reduced KVA demand readily satisfied limited power facilities, where conventional single phase would not.

Not only did the strength of spotwelded assembly exceed requirements, but Sciaky Three-Phase operation eliminated need for special metal finishing.

Compared to previous method of arc welding, production soared . . . a fraction of the equipment and floor space was needed . . . three unskilled workers replaced many highly skilled men . . .

Write for the complete story of Grand Rapids Metalcraft's use of standard Sciaky welders for this job. Ask for "Resistance Welding at Work," Volume 3, No. 8.

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This May Be the Year for Tax Help

Tool builders hope Congress will revise outmoded depreciation policies . . . President's State of the Union Message encouraging . . . Tax proposals—By *E. J. Egan, Jr.*

Machine tool builders have their fingers crossed as they wait for congressional decisions on new or revised tax policies. Builders hope this is the year when they, and their customers, will get a reasonable and realistic tax depreciation policy.

Since 1934, users of metalworking equipment have been shackled with low, straight-line depreciation rates which they have to spread in equal annual amounts over the estimated useful life of their machines. Experience has shown that "estimated useful life" is far too long in most cases. Technological improvements in machine tools and 'round-the-clock use of equipment have made many machine units obsolete in much less time than originally estimated.

Doesn't Fit Facts . . . In 19 years Congress has not changed the law to match the facts as presented by industrial groups and even congressional committees. The Treasury Dept. still insists that the cost of a machine tool bought in peacetime should be depreciated over a 15 to 20 year period. Actually, the equipment may be worn out or outmoded 5 years after it was purchased.

Proponents of the "status quo" depreciation policy insist tax revenues would fall off alarmingly if faster writeoff rates were allowed.

Change May Come . . . But the situation now looks ripe for a change. President Eisenhower's State of the Union message indicated he would ask for depreciation changes. Best guess is White House recommendation will call for doubling the present straight-line percentage allowance, and switching this annual deduction to the undepreciated balance instead of deducting it each year from the original cost. This would shunt the bulk of the writeoff to the early years of equipment use.

The President's expected proposal differs somewhat from the "optional" depreciation policy advocated for many years by the National Machine Tool Builders' Assn. This method would permit a manufacturer to writeoff all or any part of the cost of new equipment in the year it was acquired and placed in operation. Any cost balance could be written off in subsequent years.

MAPI Suggests . . . Still another set of recommendations for Congress to consider is detailed in a forthcoming book, *Realistic Depreciation Policy*, published by the Machinery & Allied Products Institute. The MAPI volume makes these specific suggestions:

(1) As an alternative to the present system, authorize taxpayers to elect a double-rate declining balance writeoff, with either group or item accounting.

(2) Provide an official set of multipliers and authorize taxpayers to expand their original-cost book values to the equivalent in today's dollars.

(3) Take action on both of the foregoing suggestions at the same time. If this is not feasible, give precedence to suggestion No. 1.

The new Congress is seemingly in the mood to do a thorough cleanup job on what has long been considered a hodgepodge Federal tax setup. Machine tool builders hope the mood will last long enough to change present metalworking depreciation policy.

Tell Replacement Story . . . Cincinnati Lathe & Tool Co. has put a show on the road to tell the story of its campaign to replace obsolete metalworking equipment. As shown in the photograph below, the firm has bought and outfitted a special bus to tour the nation.

The coach contains 3-D projection equipment, a screen and seats for eight people. It will also hold operating machine tools and other exhibits. A 15-min. 3-D film *A Way of Thinking*, will be shown to metalworking shop operators, vocational school leaders, and industrialists throughout the country.

The project is designed to emphasize the fact that much productive effort is being wasted through use of obsolete machinery.

CINCINNATI Lathe & Tool Co. puts machinery replacement show on the road (see above).

"Let me tell you something!"

"Don't neglect cleaning costs! Get yourself a good, long-lasting shot and you'll save money!"

Here's a tip from an old timer in the foundry business, who knows from experience the importance of *quality* in shot used for cleaning castings.

That's exactly the kind of product METAL BLAST turns out, in ANNEALSHOT and SUPER-ANNEALSHOT. Raw materials going into the melt for these fine abrasives are carefully selected. Forming and heat treating equipment is modern and efficient. Production operations are rigidly controlled. So, METAL BLAST is confident it is offering the very finest shot in the market.

If this fits your thinking, call in your METAL BLAST representative or write direct to **METAL BLAST, Inc.,** 872 East 67th St., Cleveland 3, Ohio.

METAL BLAST ANNEALSHOT
chilled shot and grit
SUPER-ANNEALSHOT
malleable shot and grit

REPORT TO MANAGEMENT . .

Tremor in economy

Maybe you can't yet genuinely convince the workingman that the fractional rise in unemployment will soon clobber his job security--but yell calamity long enough and you can undermine his buying optimism. That's why unemployment outcries, basically directed against the White House, have installed a tremor in the economy. Whether the tremor becomes a quake depends on how much more unemployment ammunition falls into the political opposition's hands and how the consumer reacts to it.

How bad is unemployment?

How valid is the case for unemployment danger? In the last 2 months of '53 almost 700,000 people lost their jobs--many in temporary layoffs. Total number of unemployed may now stand at roughly 2 million. More may be added. Just how bad is that? First of all, the base for the unemployment hike was exceptionally low--only 1,162,000 in October '53. A great many of the newly unemployed have been marginal labor not normally pressed into industry service. Second, monthly average unemployment in years previously considered comfortable was as high or higher than current figures. In 1951, average unemployment was 1.9 million; in 1950, 3.2 million; in 1949, 3.4 million.

Marginal labor retires

Can more marginal labor be retired gracefully? According to Dept. of Labor, since 1950 1.7 million women entered the workforce against only 602,000 men. Aside from the fact that as a class women find it less necessary to work than men, there is much less furore when women workers are dropped from the payroll.

Labor shares in adjustment

Did labor expect to go unscathed while industry underwent a transition to more normal markets? Truth is that labor has been sharing in the adjustment all along. The present rise in unemployment is the latest symptom--and the most dramatic--of a change that first showed up last year in workweek and earnings. From a peak of 41.1 hours in March '53, the manufacturing workweek had fallen to 39.9 hours by November. Average weekly earnings hit $71.93 in March but dipped to $71.02 by November--despite a 3¢ rise in hourly earnings.

Snaps back to normal

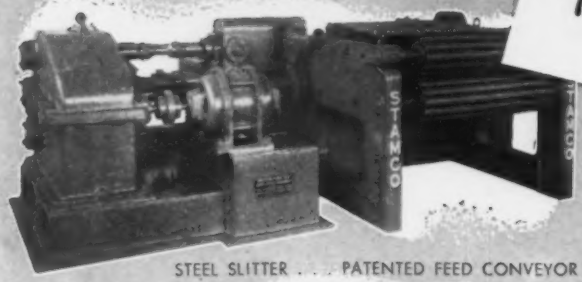
More evidence that labor was snapping back to normal: In June 1953 the hiring rate climbed to 5.1 per 100 employees. When in November the hiring rate sank to 2.7 per 100 it fully reflected industry's maneuvering to adjust output. In the same period, layoffs rose from a scant 0.9 per 100 workers to 2.4 per 100. This proved potent ammunition for pessimists, with mass production industries as main targets. From August to November, manufacturing industries contributed 517,000 names to unemployment rolls.

Credit buying braked

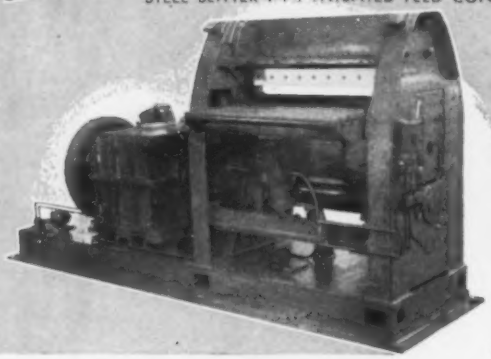
That the consumer's buying attitude was becoming more sensitive to hard times propaganda was evident when total credit buying last November rose only $86 million--less than a fifth of '52 growth. Non-installment credit fell $14 million while installment buying was upped $100 million against $350 million in 1952. Meanwhile, department store sales which recuperated late in December continued their gains in January.

For Special Operations in Steel Mills...

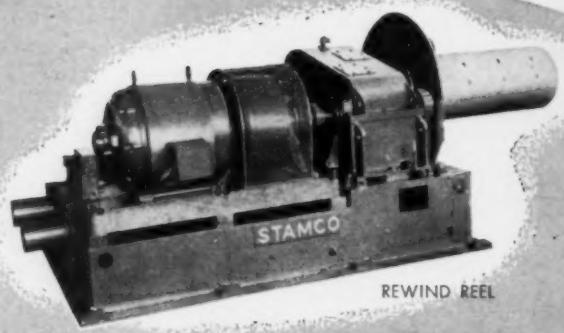
PAY-OFF OR UNWIND REEL



STEEL SLITTER . . . PATENTED FEED CONVEYOR



UP-CUT SHEAR



REWIND REEL

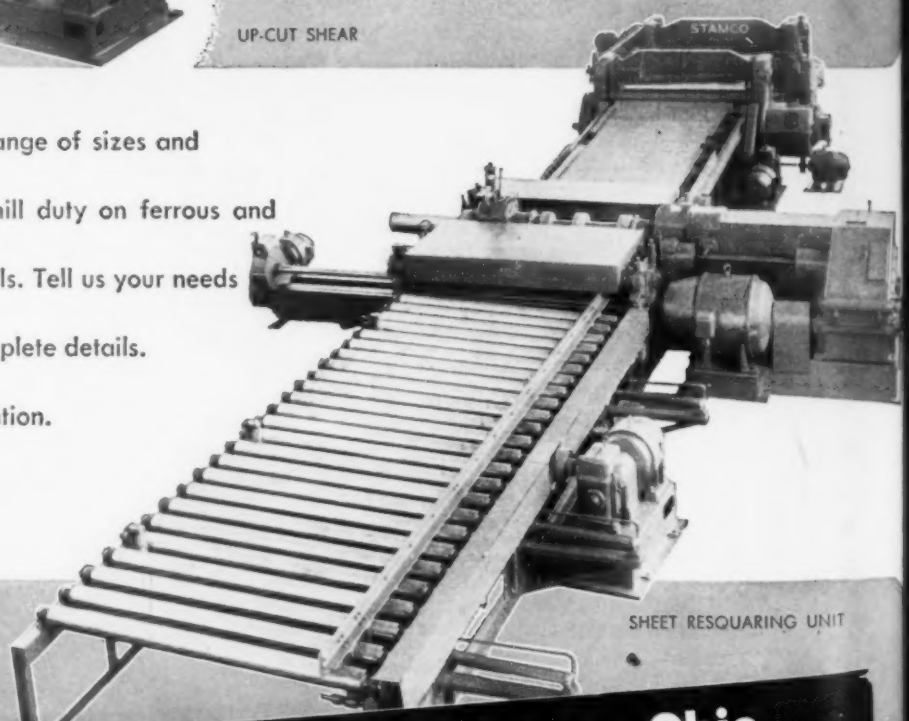
—call or write

Stamco

for the equipment you need

Available in a wide range of sizes and speeds for warehouse and mill duty on ferrous and non-ferrous materials. Tell us your needs and we'll give you complete details.

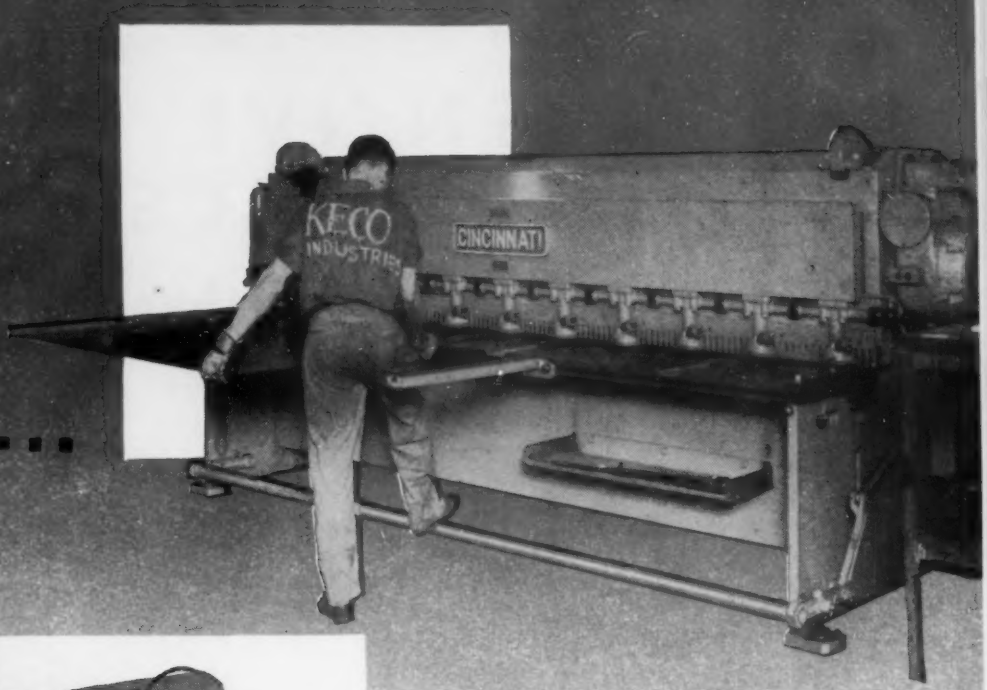
No obligation.

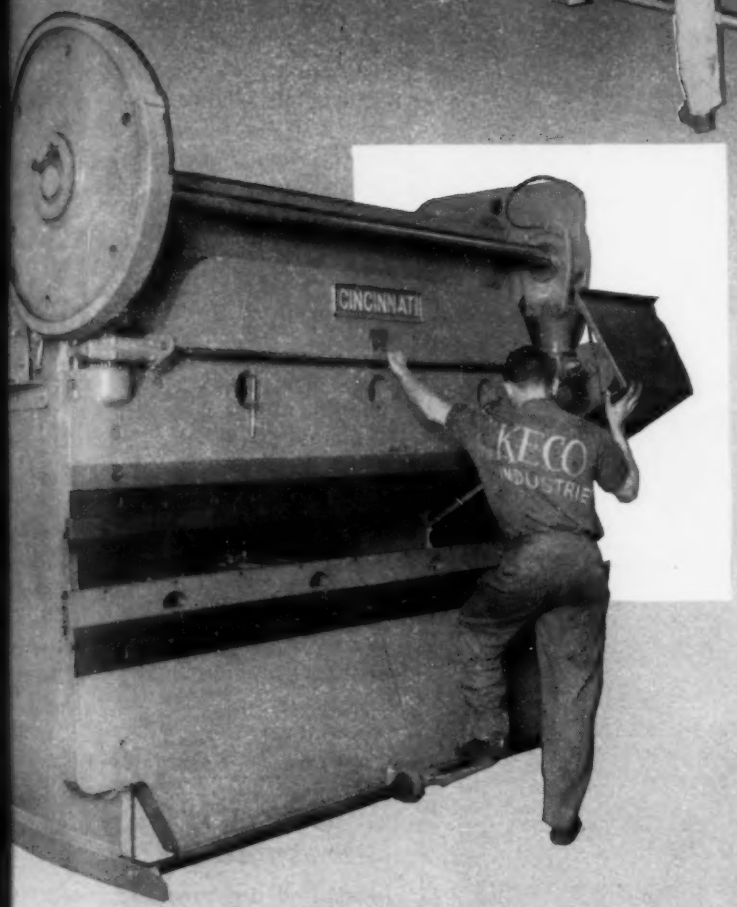


SHEET RESQUARING UNIT

STAMCO, Inc., New Bremen, Ohio

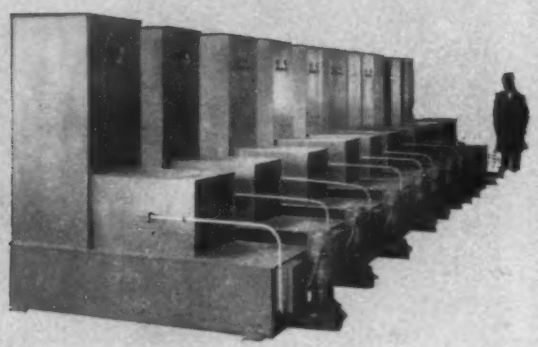
3 times as fast...





with this CINCINNATI team

graphs courtesy of the Keco Industries,
nati 25, Ohio



Cooling towers for portable air conditioning units

The floor-to-floor time consumed in shearing and forming panels for air-conditioning units, was cut from 12 minutes to 4 minutes at Keco Industries, using a Cincinnati Brake and a Cincinnati Shear.

Accuracy and rapid handling effected these savings.

In your shop, there may be opportunity for real costs reductions. Investigate Cincinnati Shears and Cincinnati Press Brakes.

Write for Cincinnati Shear Catalog S-6 and Cincinnati Brake Catalog B-4.

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PREVENTIVE MAINTENANCE

eliminates truck downtime

READY-POWER IS *BEST* FOR PREVENTIVE MAINTENANCE

Tie up a truck because of power failure? Never! Equip your fleet with *interchangeable* Ready-Power gas-electric units and, then, have one extra for the shop. Thus, power units can be rotated for preventive maintenance . . . and your trucks stay *on the job* . . . where they belong.

Remember...Your Truck Is No Better Than Its Power!

CONTINUOUS-DUTY POWER UNITS

The READY-POWER Co.

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Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks

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Continued

Concrete floors

The many factors that produce *Dynapakt* concrete floors are fully explained in a new illustrated booklet. The *Dynapakt* system is traced from formulation to installation. Systems are compared and their respective worths are analyzed step by step. How the low water ratio concrete is mixed, densified by power impacting and rolling, and finally finished to create greater resistance to wear and abuse is graphically shown. *Dynapakt* floors are ready for use 24 hours after installation. *Flash-Stone Co., Inc.*

For free copy circle No. 11 on postcard p. 67.

Plow drill

New plow drill, designed for use with three- and four-bottom plows, has been added to line of farm equipment manufactured by Minneapolis-Moline Co. According to company engineers, new plow drill, designated as the PC and composed of a packer, drill and press wheels, will enable farmers to take advantage of good soil and weather conditions to plow, pack, seed and cover in one trip over the field. PC plow drill is available with either lever lift or power lift. *Minneapolis-Moline Co.*

For free copy circle No. 12 on postcard p. 67.

Ultrasonic test gage

Illustrated 4-p brochure issued by Branson Instruments, Inc. presents all essential data necessary for an intelligent selection of the ultrasonic thickness - measuring instrument best suited to a particular problem. Application, range of thickness, accuracy, physical and electrical characteristics are among topics covered in detail, and there is an extensive listing of various types of transducers available for instruments for different types of work. Tabulated data covers both models of the portable Audigage thickness testers as well as new automatic Vidigage. *Branson Instruments, Inc.*

For free copy circle No. 13 on postcard p. 67.

Black & Decker
Cases for Comment

MAINTENANCE
(Case History 8168)
Removing rust fast with wire brush and versatile B&D Portable Grinder

CONSTRUCTION
(Case History 10634)
1616 houses built at 2-a-day rate... thanks to B&D Heavy-Duty Saws

PRODUCTION
(Case History 10691)
20% more production 20% faster...it's a Black & Decker Drill

Photo shows drilling of 10 gauge steel for Victor Furnace. Manufacturer reports use of B&D Drill resulted in 20% speed up, 20% production increase. Drills standing up very well after 8–10 years use...8 hrs. a day...5½ days a week.

Jack-Sure shows long, trouble-free service

SMALL DRILLS. Typified by "handful of power" ¼" Heavy-Duty Hole-gun.* Ideal production tool. Exceptional in "close-corner" drilling.

LARGER DRILLS . . . Models and speeds to fit any job in capacities from ¼" to 1¼" in steel, double in hardwood.

SCREW DRIVERS . . . Drive anything from delicate screws to large nuts and bolts. Many models, positive and adjustable clutches.

SANDERS . . . Drive abrasive discs, wire cup brushes, saucer grinding wheels, other attachments. Four models, 7" and 9" capacities.

BENCH GRINDERS . . . Three models, 6"—10" wheel diams., ¾ to 1 H.P., for sharpening, grinding, wire brushing, buffing.

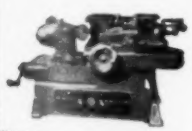
POLISHERS . . . Clean, polish, seal in *one* operation. Three models including unit with *exclusive* automatic polish feed.

HAMMERS . . . Drive star drills, cold points, etc., in masonry, other materials. Four models, ½" to 2" hole-capacity in concrete.

PORTO-SHEARS* . . . For fast, accurate cutting of ferrous and non-ferrous sheet metal. Two models, 12 & 16 gauge capacities in steel.

VALVE SEAT GRINDERS . . . Famous "Nitro-Centric"* action puts a mirror finish on internal combustion engine valve seats in seconds.

PORTABLE GRINDERS . . . Bring the tool to heavy, bulky, hard-to-move work. Perfectly balanced. 3", 5" and 6" wheel diams.



VALVE REFACERS . . . Speedily grind factory-accurate angle on valve faces. Also grind valve stems, tappets and rocker arms for exact clearance.

FACTORY SERVICE . . . A B&D *extra!* Nationwide company-operated branches within 24 hours of *any* customer provide fast, accurate service at reasonable cost!

Industry reports prove . . . for increasing production . . . speedier construction . . . easier maintenance . . . *at lower cost* . . . it's hard to beat Black & Decker Power. They find that in every B&D Portable Electric Tool they get just the right power to do the job.

And they can be sure of getting this right power in B&D Drills, Screw Drivers, Saws, Grinders, etc., because Black & Decker custom builds its own motors. These motors, plus husky housings and precision parts, mean you get a tool that's easy to work with and hard to hurt. In every B&D Tool you have a real time-, trouble-, money-, and manpower-saver.

Want more information? Then ask around your industry . . . your own shop. Call your B&D Distributor for demonstration. And write for your copy of the complete *1954* B&D catalog. Address: THE BLACK & DECKER MFG. CO., 603 Pennsylvania Ave., Towson 4, Maryland.

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PORTABLE ELECTRIC TOOLS

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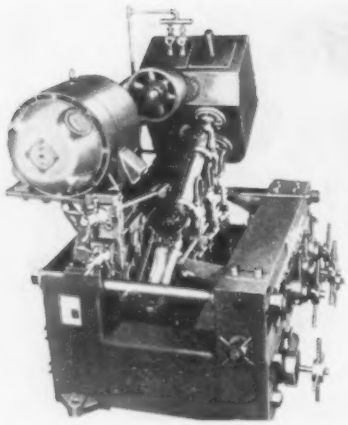
NEW EQUIPMENT

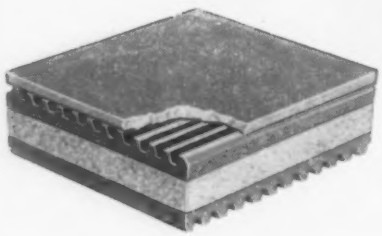
New and improved production ideas, equipment, services and methods described here offer production economies . . . just fill in and mail the postcard on page 67 or 68.



Heavy-duty straightener for hot-rolled bars

Feature of a new heavy-duty straightener for hot-rolled bars and heavy-walled tubes is a water cooling system which makes possible the handling of special alloy bars at elevated temperatures. Extremely compact, the machine is said to provide accurate, end-to-end straightening with excellent surface quality. Equally adaptable for steel or nonferrous tubes and round bars, the 1½ BO has a straightening speed ranging to 400 fpm. It handles tubes from 5/16 to 3 in. OD and bars from 5/16 to 2 in. diam at low straightening cost. The Sutton 5-roll principle distributes the straightening loads over three points; unit pressures are reduced and maintenance is minimized. Design is engineered for long roll life and anti-friction bearings are used throughout the rugged construction. *Sutton Engineering Co.*

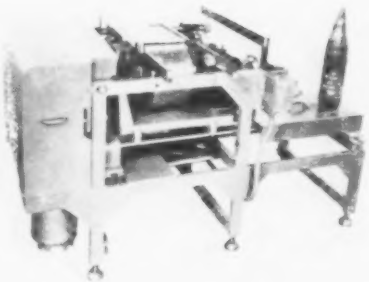
For more data circle No. 14 on postcard, p. 67.



Permits fast re-arrangement of production lines

New Elasto-Rib damper, an inexpensive vibration isolating material, helps manufacturers increase machine and worker productivity by allowing quick re-arrangement of production lines for new set-ups without the usual downtime. This easy-to-install pad-type damper adds great mobility to heavy equipment by eliminating expensive bolting to floors, yet prevents machine walking. It has a long useful life, does not pack down, and can be used over and over in new locations. Elasto-Rib utilizes the elastic and damping properties of both cork and rubber. *Korfund Co., Inc.*

For more data circle No. 15 on postcard, p. 67.



Production line printing of cylindrical objects

An automatic marking machine for printing on heavy cylindrical objects can become a part of the production line. It will automatically receive, print and eject the objects being marked, or can be manually fed if desired. Originally developed for in line marking of projectiles, it is adaptable for imprinting cans, containers and similar objects, particularly where weight is a problem. The complete inking and printing mechanism slides out from the side of the machine for easy access when built into conveyor or production line. Printing legend is easily changed. *Markem Machine Co.*

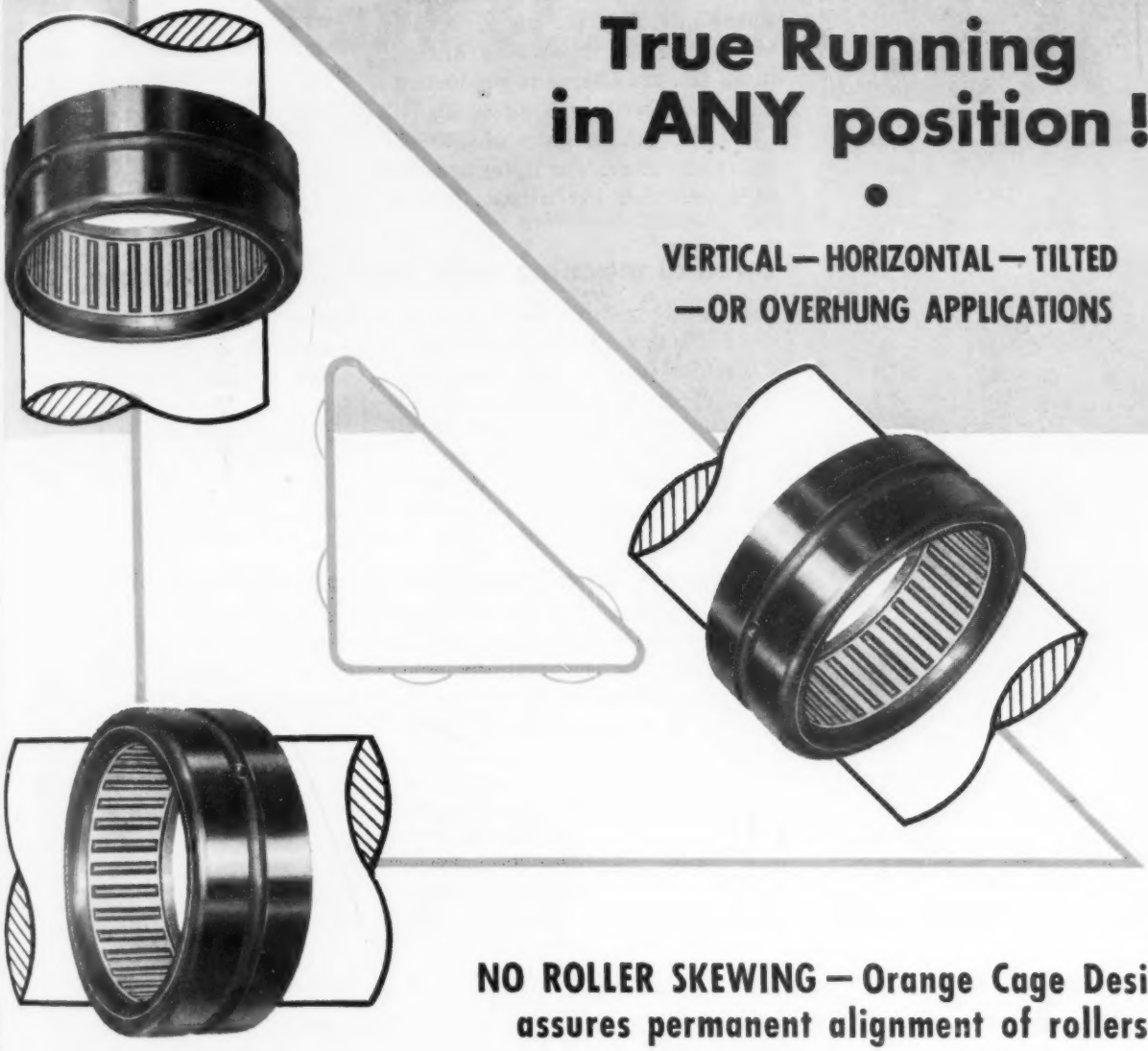
For more data circle No. 16 on postcard, p. 67.

Box stitcher handles heavy duty and light jobs

All types of corrugated and solid fiber boxes can be stitched quickly and securely at low cost with the new N-5 Acme-Morrison box stitcher. It is available in five different types: the post, arm, combination post and arm, side seam, and top. By means of a small hand lever, adjustment is made to handle work thicknesses from 1/16 to ¾ in. This versatility makes it possible to use the machine in special tacking and carding operations also. Formers, flat knife and drivers are reversible for longer life. Wire tangling is eliminated by the built-in brake mechanism of the coil holder supplied with the machine; Acme's accurate wire stitching method is used in the machine. *Acme Steel Co.*

For more data circle No. 17 on postcard, p. 67.

Turn Page



True Running in ANY position!

•

VERTICAL — HORIZONTAL — TILTED —OR OVERHUNG APPLICATIONS

NO ROLLER SKEWING — Orange Cage Design assures permanent alignment of rollers

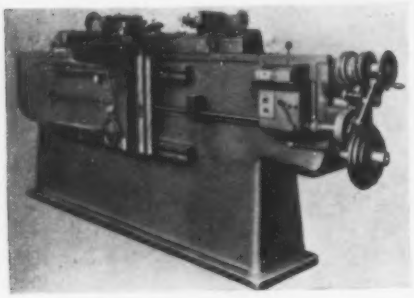
ORANGE
Cage Type
NEEDLE BEARINGS

Orange Cage Type Needle Bearings have brought the space-saving, high-load features of needle bearings to many applications hitherto unsuited for conventional types. Not only are they true running in any position, but are successful on relatively high-speed applications and less affected by misaligned mountings or uneven loading.

In the Orange cage design, square end rollers are held in alignment by pockets of a free-floating, land-riding cage of anti-friction, non-ferrous metal. Cage merely guides—does not wear on rollers. Operation is exceptionally smooth and quiet, with long, trouble-free life.

Stock sizes from ½″ to 8″ shaft diameters, fully interchangeable with standard heavy-duty needle bearings. Write for Engineering Data Book.

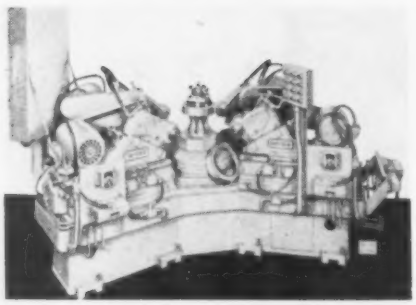
ORANGE ROLLER BEARING CO., INC., 570 Main Street, Orange, N. J.



Dividing machines graduate in inches or meters

Machines for circular, cylinder and linear dividing of gages, scales, verniers, rules, measuring drums, dials, etc. are offered in production models as well as high precision units with an accuracy of 0.00008 in. (0.002 mm). The latter are for high precision graduations of optical measuring equipment, machine parts, etc. Linear dividing machines are available for operations requiring maximum lengths up to 50 in. They can graduate work of almost any material, including metals, glass, plastics. *Wm. J. Hacker & Co.*

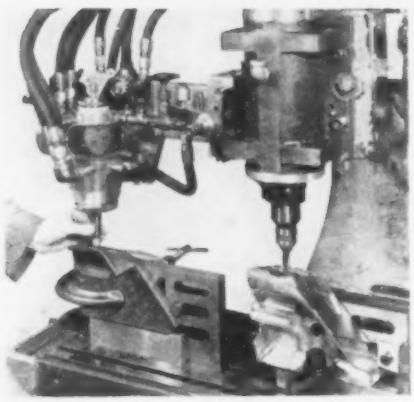
For more data circle No. 18 on postcard, p. 67.



Special machine mills cast aluminum parts

New 4-way special machine with automatic cycle, mills eight slots in a circular part of cast aluminum alloy. A part is loaded and clamped manually on a fixture which oscillates through a 90° arc. When the starting button is pressed, the four tools rapid advance and proceed to mill the first four slots; fixture automatically indexes for second slots. Tools are high speed steel with a feed rate of 32 ipm and speed of 350 sfm. Production is 72 pieces per hr at 80 pct efficiency. *Snyder Tool & Engineering Co.*

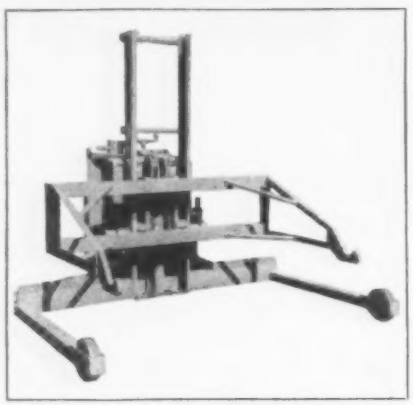
For more data circle No. 19 on postcard, p. 67.



Converts to all-purpose duplicating tool

While developed for the aircraft industry to make irregularly contoured parts, a new 3-dimensional Model A-3D hydraulic tracer is used in other industries as a converter for creating an all-purpose, fast-production duplicating tool. Installation on new or older machinery can be accomplished readily in most cases. The new True-Trace valve traces 360° in all directions. Any combination of traverse, transverse and vertical motion is simultaneously controlled via one tracer spindle. Tolerances can be insured to as close as 0.005 to 0.0005 in., it is stated. The tracer can be made to follow a low-cost, one-to-one ratio three-dimensional wood, plaster or metal template. New cutting techniques allow for positive and constant feed rates. *True-Trace Sales Corp.*

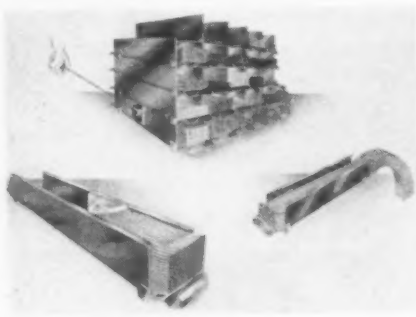
For more data circle No. 20 on postcard, p. 67.



Lift truck adapted for handling heavy rolls

This standard truck adaptation solves the problem of removing heavy rolls of felt from storage and placing them on a coating machine ready for processing. The rolls are 42 in. diam x 77 in. long and weigh over 3000 lb. Lifting height of the truck is 65 in. A shaft through the center of the roll fits into the notches of the forks, which makes transporting and lifting an easy one-man one-truck operation. The truck except for the mast and carriage is a standard Lewis-Shepard Model M—a straddle type of stand-up end control design. L-S articulated linkage design makes it possible to introduce two rugged stabilizing casters under the load carrying frame of the truck. *Lewis-Shepard.*

For more data circle No. 21 on postcard, p. 67.



Wire racks speed assembly operations

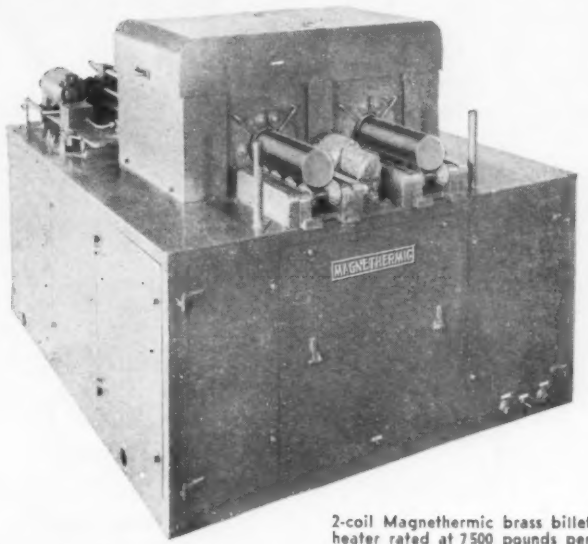
Wiracks are designed for use on assembly lines to store wire in a compact, accessible and easy-to-see manner at all times. They permit instantaneous visual inventory, allow greater flexibility of bench layout and an ease of selectivity. Wiracks can be stacked as high as desired, flush at the front or at an angle. They lock one above the other safely and can be quickly set up and taken down without using tools. Individual units are 2½ in. wide, 2 in. high, 15 in. long. Raised lip at end positions wire for speedy selection by worker. *Stackbin Corp.*

For more data circle No. 22 on postcard, p. 67.
Turn Page

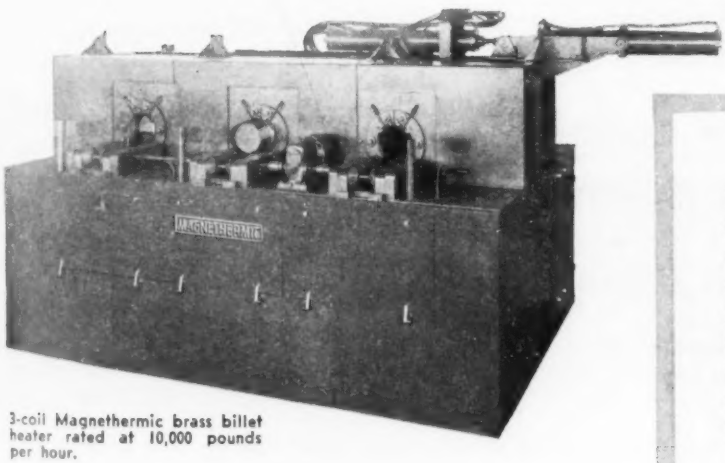
Induction Heaters for Brass and Copper Billets

REDUCE OPERATING COSTS

Magnethermic 60-cycle brass and copper billet heaters, now in operation, prove that they do reduce operating costs. Billets are heated in two or three minutes rather than hours. Temperature control is extremely accurate . . .each billet is discharged at exactly the same temperature. No warm-up time is required. On initial start ups, press the button, and in two or three minutes, heated billets are ready for further processing. No need to schedule billets ahead of time. Not more than three billets are in process at any one time.



2-coil Magnethermic brass billet heater rated at 7,500 pounds per hour.



3-coil Magnethermic brass billet heater rated at 10,000 pounds per hour.

MAINTENANCE

Furnace damage is caused by heat. In a typical Magnethermic heater, the heating chamber is a tube 8" in diameter, 24" long, and water cooled for long life. In a conventional furnace, the heating chamber may be 40 ft. long, 8 ft. wide and 3 ft. high. It stands to reason that the latter will require many times the maintenance that the induction coil requires. Then too, no need to shut down when relining the coil. Operate on the other coils, or put in a spare coil. Coils can be changed in ten minutes and relined in an hour or two.

ALL SIZES

Magnethermic makes a single, two, or three-coil heater for any production requirement needed. All heaters are shipped completely assembled. Installation cost is at a minimum. Working conditions are ideal and floor space is negligible.

Heaters will operate equally well on extrusion billets, piercer billets, or wire bars. If you have a heating problem, let one of our engineers discuss it with you. A letter or phone call will receive prompt attention.

60-CYCLE

MAGNETHERMIC®

corporation

3990 SIMON ROAD YOUNGSTOWN 7, OHIO

INDUCTION HEATING

The man who got caught with his Plants down

Thought he could meet competition with manufacturing facilities ten to twenty years old.

"Why not," he said. "They're still going strong. Besides, we can't afford to invest in new equipment — costs too much these days."

NOTE: Not long after, an aggressive, more modern competitor stole this company's major markets away.

AFTERTHOUGHT: *When properly planned,* new or improved production equipment *pays for itself* in better products, and more of them, at a lower cost.

That's where Taft-Peirce can help you. As the country's leading contract manufacturer, we design and build hundreds of special machines and machine tools every year. For an interesting resume of our experience and facilities, send for 92 page illustrated booklet, "Take It To Taft-Peirce."

For Engineering, Tooling, Contract Manufacturing

TAKE IT TO TAFT-PEIRCE

The Taft-Peirce Manufacturing Company, Woonsocket, R. I.

TELEPHONE: WOONSOCKET 1.

Dipping tank

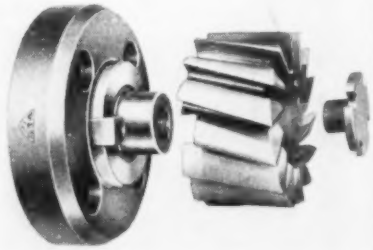
Production dipping tank for plastic seal hot dip protective coatings is offered in a bench model with 14-lb capacity and with or without an agitator. With positive agitation created by the impeller type agitator, and special heating elements that radiate heat direct to the sides of the tank, more rapid heating and

cooling is accomplished. A Robertshaw thermostat maintains the temperature of the plastic automatically. Reportedly material can be heated from room temperature up to 360°F in approximately 1 hour. Positive agitation gives a constant level in the dipping area for mechanical conveyor dipping operations. *Globe Imperial Corp.*

For more data circle No. 23 on postcard, p. 67.

Heavy duty adapter

Quick change type shell end mill adapter is standardized for No. 50 N. S. drive milling machines, is available in two arbor sizes which fit standard shell end mill bores.



The adapter mounts directly on the front spindle flange of the machine. Standard bolt holes and key slots provide for rigid mounting, positive drive. *Goddard & Goddard Co.*

For more data circle No. 24 on postcard, p. 67.

Turn Page

Graph-Mo® steel die makes this "impossible" draw without galling or scoring

MANUFACTURERS Service Company in Cleveland was faced with a tough problem of making a die for a dryer fan housing 3⅞" deep. The scroll shape made it an all but impossible draw for ordinary die steels—they'd pick up and gall. Looking for an answer, they tried Graph-Mo®—one of four graphitic tool steels developed by the Timken Company. Result: good clean parts, no scuffing, no galling, no scoring.

Graph-Mo tool steel can handle jobs like this because of its unique composition. It contains free graphite, one of the best natural lubricants. This graphite gives Graph-Mo outstanding anti-friction properties and prevents scuffing and galling even in such difficult draws as this one.

Graph-Mo has a second great advantage over conventional tool steels: It outwears them on an average of three to one. Along with the graphite, Graph-Mo contains millions of tiny particles of diamond-hard carbides, one of the hardest-wearing substances known.

Despite its superior wear resistance, Graph-Mo machines about 30% easier than conventional tool steels. And it responds uniformly to heat treatment, thus requiring a minimum of grinding on the hardened dies.

Graph-Mo is one of four graphitic tool steels developed by the Timken Company. Would you like more information about their uses in dies, punches, gages and machine parts? Write for the new Timken Graphitic Steel Data Book just out. The Timken Roller Bearing Company, Steel & Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO."

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

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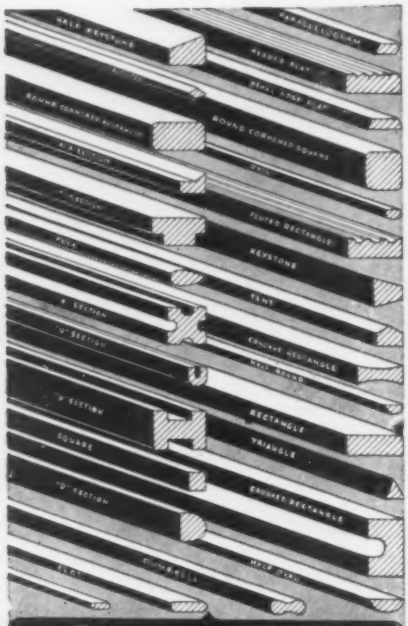

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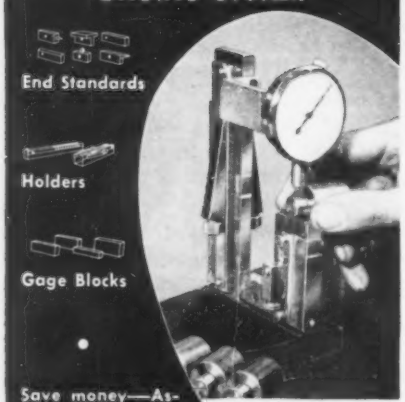
with DoALL MICRO-STEP GAGING SYSTEM



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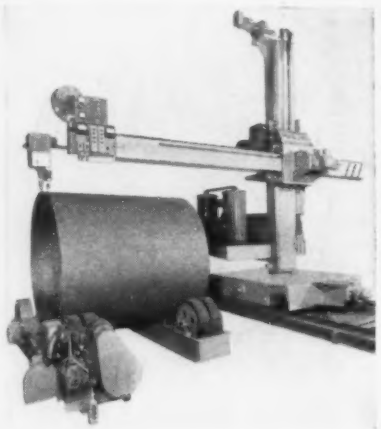
The DoALL Company, Des Plaines, Ill. 5

—New Equipment—

Continued

Welding head pilot

New type automatic welder that adapts to a wide range of weldments, works as a robot pilot which guides welding head smoothly without manual assistance. It may be used in conjunction with all types of turning rolls and positioners. The power car moves up or down track at selected, variable welding speeds; rapid traverse return. Boom travels in or out at selected, variable welding speeds; moves up and down; head lowers to floor level. The mast with the boom rotates 360° on power car; welding head swivels 180°. The operator selects the speed, pushes the buttons and watches the gages. It's entirely automatic. Manipulator is available in standard models on power cars or fixed base, with vertical boom travel from floor level to 24 ft., longitudinal boom travel up to 30 ft. *Pandjiris Weldment Co.*



For more data circle No. 25 on postcard, p. 67.

One stage phosphating

Econote is a new product that provides an inexpensive method for cleaning and preparing metal for painting. It will clean, etch, neutralize and phosphatize in a single spray stage operation. No rinse is necessary. Besides having good cleaning characteristics, Econote creates an iron phosphate coating of between 25 and 40 mgs per sq ft. It can be used for treating steel, cast iron, aluminum or zinc, and substantially improves paint adhesion. *Metasurf Corp.*

For more data circle No. 26 on postcard, p. 67.

Turn Page

WITH FOUR TIMES THE SPEED; ONE FOURTH THE DISTORTION

"Manual Lincolnweld's" high-current-density welding could solve your fabricating problem

THE PROBLEM: To fabricate a table 46" square calls for welding 1" plate, ribbed with 2" by ½" and 4" by ½" bar and channels from 3/16" plate. The hub is hot rolled bar and center ring is 6" by ¼" stock. With hand welding, distortion averaged ½" to 5/8".

LINCOLN'S ANSWER: High-current-density welding in agglomerated flux with "Manual Lincolnweld" at speeds 4 times that possible with hand welding using coated electrodes. Speed on ¼" fillets increased from 7" to 28" per minute.

THE RESULTS: Concentrating high welding currents on 5/64" electrode gives full penetration in one pass. Distortion is reduced from 5/8" to only 1/8". Welds are smooth, uniform and essentially self-cleaning, saving manhours in cleaning and finishing to cut shop production costs still further.

Fig. 1. Simpler to Fabricate. Positioner table is fillet welded with "Manual Lincolnweld's" hidden-arc welding in granular flux. Welding speed for ¼" fillet weld is 28" per minute. Photo courtesy Worthington Corporation, Plainfield, N. J.

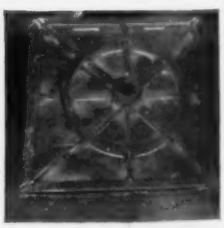


Fig. 2. Rugged Welded-Steel Table is fabricated for less cost. Welds are smooth, uniform, ductile. Distortion is cut 75% over hand welding

WHAT'S YOUR PROBLEM? Complete Automatic Service — machines, electrodes, engineering—is available at one source . . . Lincoln. Your nearest Lincoln representative can demonstrate the latest developments in hidden-arc welding to speed your production and cut shop costs.

Bulletins on boosting production efficiency with "Manual Lincolnweld" are available by writing on your letterhead. Ask for Bulletin 1303. Dept. 1513.

THE LINCOLN ELECTRIC COMPANY
CLEVELAND 17, OHIO
THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

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FIRST HIGH-SPEED, LOW-COST PROCESS OF COLD FORMING AND WELDING

NON-FERROUS TUBING

ALUMINUM · MAGNESIUM · NICKEL · BRASS AND OTHER ALLOYS

Speeds range from 30 to 120 fpm, depending on gauge and kind of metal. The process makes possible the conversion into tubing of coiled strip in gauges from 0.156" all the way down to 0.025", *without drawing and annealing*. This means drastic reduction in the cost of making non-ferrous tubing. The lighter the gauge, the greater the saving. Weld strength in many instances exceeds that of the original strength of the metal by as much as 15%.

Thus, for the first time in tube making history, through an exclusive Yoder development, coiled non-ferrous strip can be converted into high grade tubing entirely by cold process, at speeds approximating those employed in making steel tubing by resistance-welding. The story of this epoch-making development makes interesting reading to producers of non-ferrous metals as well as to manufacturers of products incorporating tubular components, both steel and non-ferrous. Send for it!

ENGINEERING YODER MANUFACTURING

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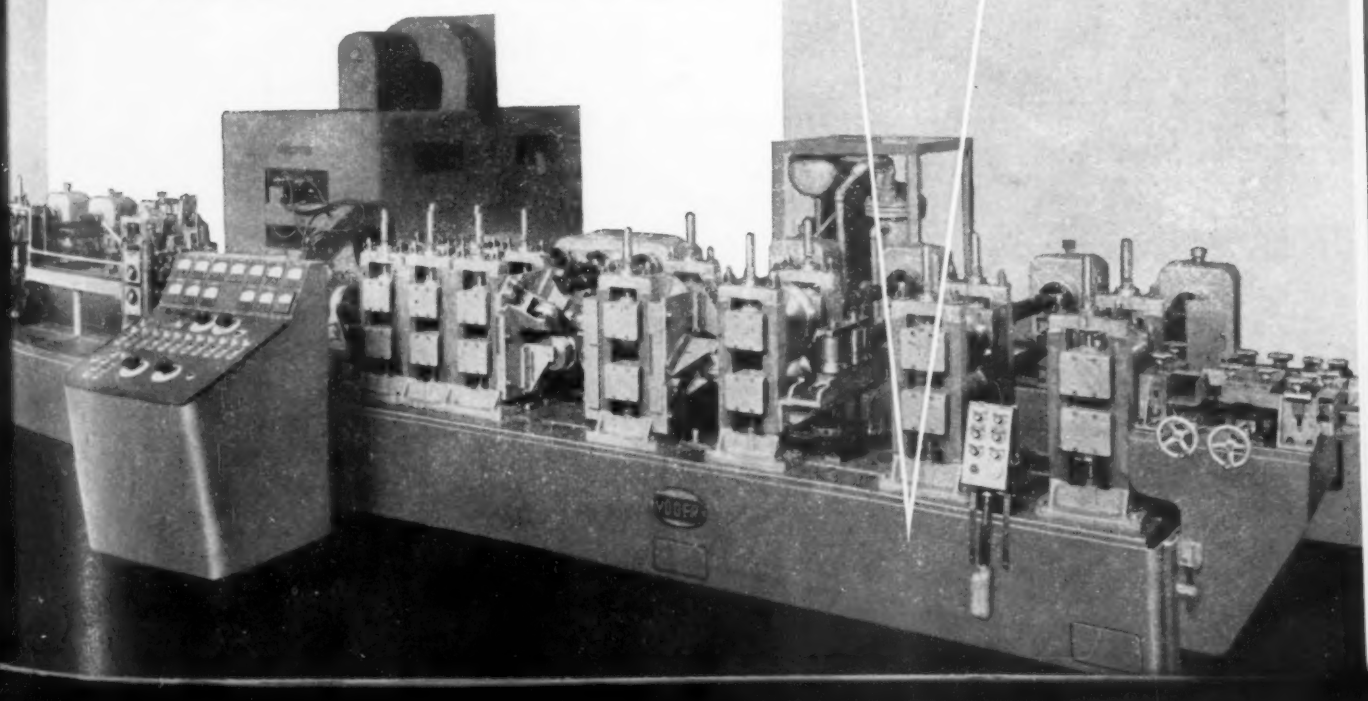

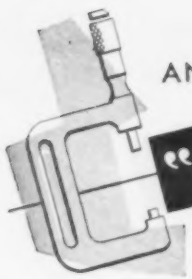

ANOTHER

"JOB ENGINEERED"

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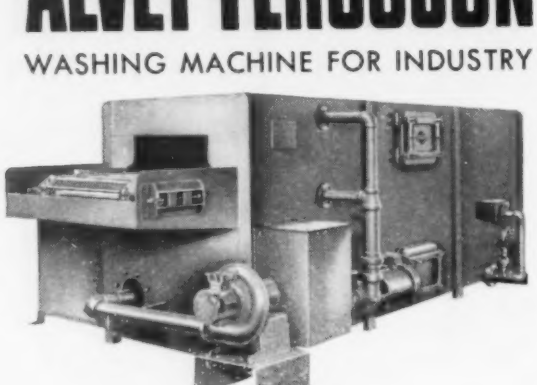
WASHING MACHINE FOR INDUSTRY

• *For a discussion of latest metal parts and products cleaning methods, write today!*



WHEN a washing machine is needed to perform an unusual operation, it's almost certain that A-F Engineers will be called upon to build it! . . . The A-F Washing Machine shown here was built especially for removing sand from steel foundry flasks. A special feature is the Slo-Flo Tank (not shown in photograph) which settles the sand out of the cleaning solution before it reaches the screening tank for recirculation. Flasks are cleaned faster . . . and each flask is *uniformly* clean!

A-F

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This instrument permits truly high speed, non-destructive sorting of raw, semi-finished or finished parts by their metallurgical characteristics. With the new Automatic Sorter Unit speeds up to 300 pieces per minute are possible with the use of suitable feeding equipment. Used by leading industrial firms everywhere.

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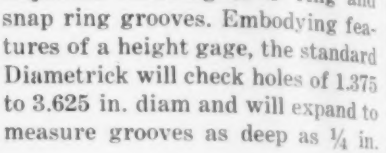
Non-destructive Testing and Measuring Instruments

— New Equipment —

Continued

O ring groove gaging

New inside diameter, dial indicator measuring instrument, trade named Diametrick, is introduced for the improved checking of O ring and snap ring grooves. Embodying features of a height gage, the standard Diametrick will check holes of 1.375 to 3.625 in. diam and will expand to measure grooves as deep as ¼ in.



Other sizes are available for smaller and larger bores. In use the Diametrick is held with the lower gaging arm resting firmly in the work, permitting rocking of upper arm in all directions. The instrument is useful also as a caliper in the tool room and experimental department. *Mutual Engineering Service.*

For more data circle No. 27 on postcard, p. 67.

Burnishing compound

New multiple purpose barrel finishing compound is said to produce brighter finishes in less time on a wide range of metals. Honite brand Multi-Burnish compound can be used with all types of barrel finishing media. During the first part of the operating cycle, the compound acts as an effective cleaner and permits rapid deburring. It develops progressively richer suds which act both as a lubricant and as effective suspending agent, resulting in high luster and brilliant color to the workpieces. One to 2 lb of the compound are sufficient for the average 16 x 30 in. compartment with full loads. *Minnesota Mining & Mfg. Co.*

For more data circle No. 28 on postcard, p. 67.

Welding cast iron

New electrode, Xyron, has a specially designed coating for welding cast iron. There is an unusual density of deposits, and cracking, cross-checks, etc., have been practically eliminated. Amperage requirements are low, the 3/32-in. electrode operating on 35 to 75 amps. The electrode can be used for building up, repairing breaks or cracks, fabricating, etc., and deposits have maximum machinability. *Eutectic Welding Alloys Corp.*

For more data circle No. 29 on postcard, p. 67.

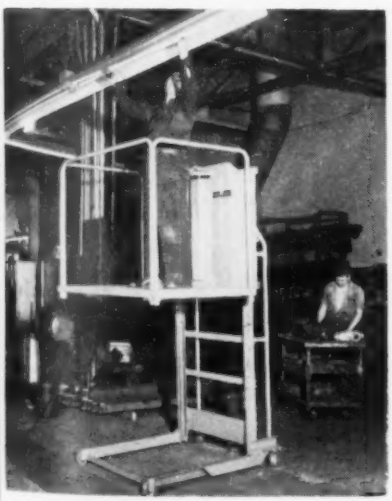
Gray metal primer

A self-spray gray metal primer has a zinc chromate base; is used for painting all metal surfaces; and provides a simple way to prepare any metal surface for refinishing. It is available in a 12-oz can with self-spray attachment. *Plasti-Kote, Inc.*

For more data circle No. 30 on postcard, p. 67.

Lifting unit

The Bootstrapper is a lifting unit on which a man standing on the platform may raise and lower himself with a hand crank. Capacity is 500 lb, platform 36 x 60 in. Pipe



railings are removable. It has caster steer with a foot-operated floor lock mounted between the swivel casters. Bootstrapper illustrated has lift height of 5 ft; higher lifts are available. *Service Caster & Truck Corp.*

For more data circle No. 31 on postcard, p. 67.

Turn Page

Along the Ohio River's "Sycamore Shores" reigns quiet peacefulness. But just a mile or so away, industrial Cincinnati is working night and day to produce its world-famous machine tools, soap, pianos, radios, television sets and conveying systems — Alvey-Ferguson *Engineered* Completely Co-ordinated Conveying Systems.

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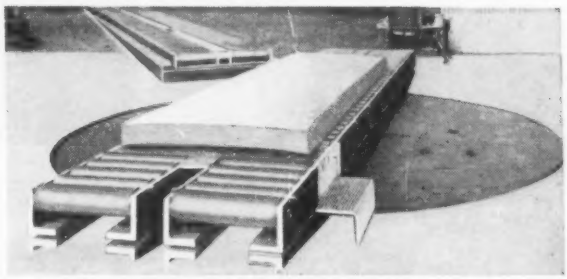
where the world's best engineered completely co-ordinated* CONVEYING SYSTEMS *are made!

A-F

YOU can SEE the SUPERIORITY of ALVEY-FERGUSON Conveyor ENGINEERING



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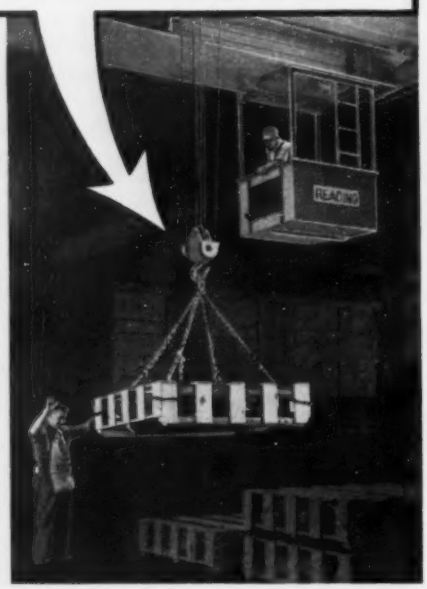
You get greater operating efficiency. More accurate spotting is possible. Precise speed control is assured. Moreover, maintenance costs are minimized because each unit can be removed and serviced individually without dismantling entire crane. Get complete information by writing for our latest 16-page bulletin. "The *Why* and *How* of Faster Production".



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Overhead
Traveling
Cranes

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READING CRANES

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- Direct Reading
- Reduces Error
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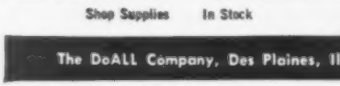

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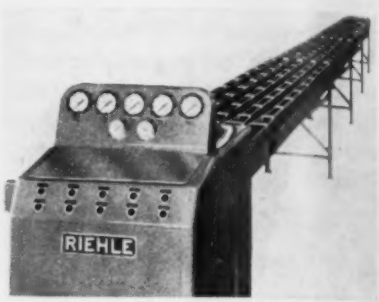
—New Equipment—

Continued

Proof-tests wire

Prestretching and proof-testing aircraft cable and other wire assemblies is possible with a new tester of 6500-lb capacity. Five different sizes of cable can be tested simultaneously, it is claimed. Built



with 5 separate tensioning units, all with different ranges, each unit can be preset to exert any load within its range, for any period from 3 sec to 20 min. The tester meets specifications of the U. S. Naval Bureau of Aeronautics. Pressure gages are calibrated to show directly in pounds the tension exerted on each cable. *Riehle Testing Machines Div.*

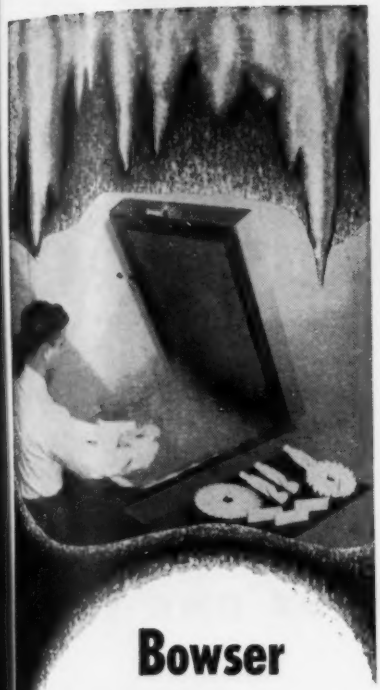
For more data circle No. 32 on postcard, p. 67.

Re-circulating furnace

New electric box type re-circulating furnace is built in nine different sizes and two different heat ranges, 0-800°F and 0-1250°F. Sizes are from 18 in. wide x 12 in.

high x 18 in. deep to 24 in. wide x 24 in. high x 36 in. deep. The furnace has new skirt type cabinet, and is furnished complete with Huppert infitrol, electronic indicating temperature controller, contactor, and switch box. *K. H. Huppert Co.*

For more data circle No. 33 on postcard, p. 67.



Bowser Cold Treatment

. . . Makes good products better

One of the most dramatic recent developments in the making of better metal products has been the use of cold treatment.

To help you take full, economical advantage of this new process, Bowser Technical Refrigeration now has available a line of standard units. These new units, with ranges from —50°F to —200°F (or lower), have countless applications in the production of superior metal products.

Bowser cold treatment can help you:

- *Increase cutting tool life as much as 500%.*
- *Eliminate distortion and cracking resulting from grinding.*
- *Permanently stabilize dimensions of precision parts, gages and tools.*
- *Improve expansion fitting, salvage out-of-size dies.*
- *Increase hardness and lengthen life of carburized alloy gear steels, blanking and forming dies, etc.*

Bowser will be glad to cold treat your sample parts, tools or products — without cost or obligation.

Write For Details

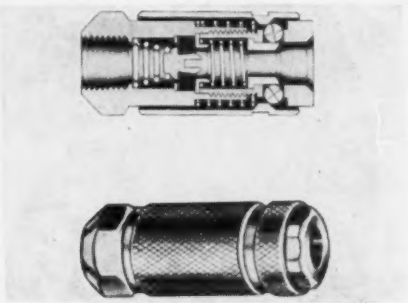
BTR BOWSER TECHNICAL REFRIGERATION

—New Equipment—

Continued

Quick air coupler

A lightweight, quick-detachable air coupler is said to offer 35 pct greater air flow, yet weighs only 4½ oz. The extra large air passage permits flow of 70 cu ft of free air



per min at 150 psi. Instant coupling action eliminates twisting or turning and free swiveling of coupler on nipple prevents kinking of the air hose. Coupler cannot be detached accidently. *Lincoln Engineering Co.*

For more data circle No. 34 on postcard, p. 67.

Safety spectacles

New shatterproof, multi-purpose safety spectacles, called Visor-Tuc Eye Savers, give almost 100 pct protection from eye injuries. They weigh hardly more than an ounce. Over-eyes protection from glare and flying particles is provided by built-in visor, an extension of the frame shaped to fit snugly against the

wearer's forehead. Injury from side or bottom is prevented by lense-flanges extending from the lenses toward the cheek. Visor-Tucs are made in a single frame style that fits all workers. The shatterproof lenses are optically correct to prevent eye strain and are available in clear and three shades of green. *Watchemoket Optical Co., Inc.*

For more data circle No. 35 on postcard, p. 67.

QUANTITY PRODUCTION OF GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

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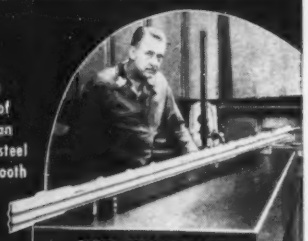
Non-Rusting • Non-Magnetic • Utmost Accuracy • Cheaper Than Metal Plates



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Technical Articles

Puzzle in metal—

HIGH PURITY CHROMIUM . . Key to Better Alloys

◆ Higher strength at higher temperature is the constantly imposed specification facing the builders of furnaces, jet engines and other equipment . . . One answer to the demand for such materials could lie in the development of a new series of chromium based alloys.

◆ A big roadblock is chromium itself . . . The "why" of chromium's behavior—it may have high strength at high temperatures and be glass brittle at room temperature—has long puzzled metallurgists . . . To get more accurate data on basic properties, researchers have sought improved methods of making high purity chromium.

◆ Availability of swaged rod from ingots of arc melted hydrogen reduced chromium has permitted more definitive studies of tensile properties using standard ASTM specimens . . . Room temperature ductility of worked wire from which a thin skin has been removed chemically or mechanically is excellent.

By H. L. Gilbert
Chemical Engineer

H. A. Johansen
Chemical Engineer
U. S. Bureau of Mines
Albany, Ore.

◆ HIGH PURITY CHROMIUM may hold the key to development of a whole new series of high temperature alloys during the next decade. The metal is relatively abundant and its value has been proved in many heat resistant and high strength alloys. But before chromium can be most effectively used, far more must be known about its properties. Pure chromium can be ductile at room temperature and has good strength at elevated temperatures. Metallurgists, and industry, face the double challenge of explaining the phenomenon of chromium's room temperature brittleness and applying this knowledge in development of new alloys.

While the strength of chromium at 500° to 800°C is high enough to be of interest, the true strength characteristics required for such applications as jet engine blades can be reached only through alloys. High chromium alloys have been studied at some length and many alloys of great strength described.

Chief drawback in this work has been the room temperature brittleness seemingly inherent with the use of chromium as the alloy base. In all cases studied however, either the chromium, the alloying agent, or both, were of quality far below that of the chromium available today. In some cases melting practice

was questionable in view of the metal's great reactivity. Chromium powder may have become contaminated beyond usefulness by reaction with traces of oxygen or water vapor in a hydrogen atmosphere furnace which would be entirely satisfactory for heating tungsten and molybdenum powders.

A low-oxygen alloy of 60 pct Cr and 40 pct Fe is readily forgeable and has excellent ductility at a tensile strength of 140,000 psi. It may be that when all constituents of one of the very high strength chromium alloys are of high purity, satisfactory ductility will be found at room temperature.

At $250 and up per pound

If this does not prove true, use of very-high purity iodide-dissociation metal for research work, and the more easily developed electrolytic and the hydrogen reduced metals for metallurgical studies may be used in finding basic causes for poor room-temperature ductility of chromium. This information may then be applied to chromium alloys.

Commercial chromium metal may be expected to contain measurable quantities of iron, copper, silicon and other metallic impurities, plus unspecified amounts of oxygen and hydrogen. A material with no single metallic impurity above 20 parts per million and with less than 50 parts per million oxygen and 5 parts per million hydrogen is considered highly pure. Except for the oxygen and hydrogen specified, such metal has been available in limited quantity at $250 and up per pound.

Production of high purity chromium has been attempted by several methods, as described in the box. From the standpoint of metallic contamination the best available form of chromium is electrolytic plate. By electrolytic deposition a high purity chromium has been produced with about 200 parts per million oxygen contamination. Material prepared in this manner has been arc melted with a tungsten electrode, and the resultant metal fabricated into ductile sheet of limited dimensions. The electrolytic cell is operated at 1100 amp per sq ft with an aqueous electrolyte containing 250 g per liter CrO_3 and 2.5 g sulfate ion at a temperature of 80 C.

PROPERTIES OF CHROMIUM

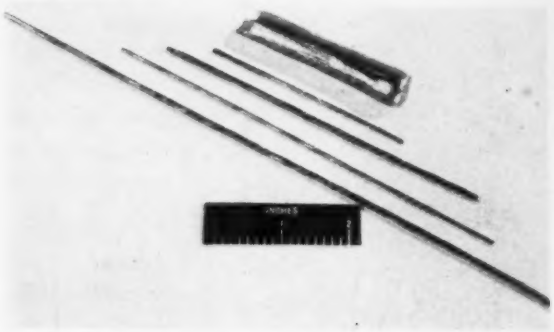
Density, 20 °C	718 gm/cc
Melting point	1845 — 1930 °C (9, 12)
Coefficient of thermal expansion (20-500 °C)	9.0 x 10^{-6} in/in/deg C
Electrical resistivity, 23 °C	14 microhm – cm
Modulus of elasticity 800 °C	37,000,000 psi
Hardness (3000 Kg load)	20 °C = 120 Bhn 200 °C = 100 Bhn 200 °C = 70 Bhn

	20 °C		700 °C
Ultimate tensile strength	12,000 psi*	127,000 psi**	41,000 psi†
Elongation	0	—	30 pct
Reduction in area	0	—	80 pct

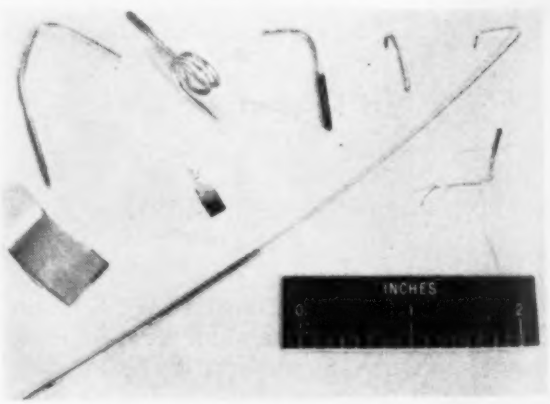
* ASTM specimen, ⅜ in. gage diam.
** Wire, 0.050 in. diam., as drawn.
† ASTM specimen, ¼ in. gage diam.

Chromium Samples

Forged, swaged and rolled . . .

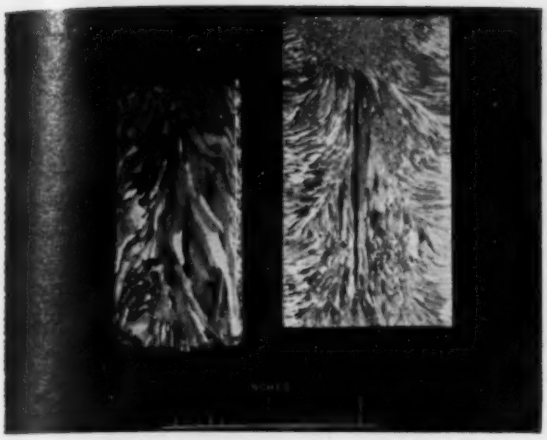


Rods swaged in iron sheath . . .

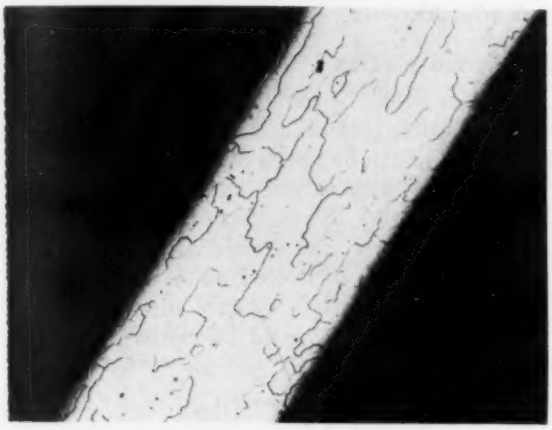


Readily worked to wire . . .

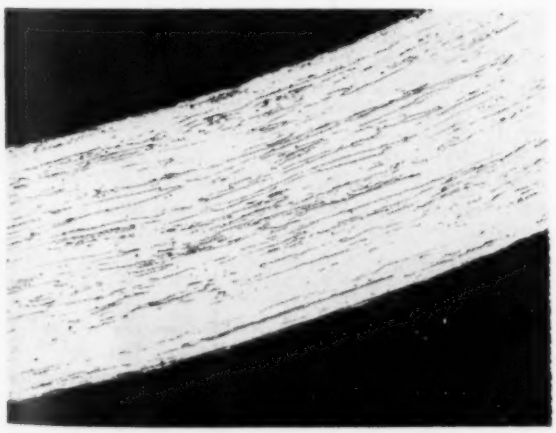
The ½ to 1 pct oxygen, normally found in commercial electrolytic metal can be removed by a hydrogen treatment. Electrolytic flakes, crushed through 60 mesh screen, are reduced in flowing purified hydrogen at 1200°C for 16 hours. This lowers the oxygen level to about 100 parts per million. The treated powder may



FORGEABLE INGOT is coarse-grained. Trace oxygen contamination causes fine-grained structure with no ductility. The ingot on the left will roll; the one on the right will not.



RECRYSTALLIZED cold-rolled sheet, edge view. Potassium ferrocyanide-electrolytic etch. 250X.



AS-WORKED cold-rolled sheet, edge view. Potassium ferrocyanide-electrolytic etch. 250X.

be consumable-electrode arc melted under inert atmosphere to give forgeable ingots.

Best recovery of metal is obtained by extruding the ingots in an iron jacket at 1100°C although press forging is satisfactory. After initial extrusion, or forging, the metal may be worked readily to sheet, rod, or wire. This metal

SIX WAYS TO MAKE HIGH PURITY CHROMIUM

Carbon reduction of chromium oxide

A mixture of chromium oxide and carbon or chromium carbide is reduced under high vacuum and at high temperature. Difficult at atmospheric pressure, regardless of temperature, because considerable carbide is formed.

A relatively high grade metal, inevitably contaminated with some carbon and oxygen.

Reduction of green chromium oxide

An aluminum powder-chromium oxide mixture is fed into a large refractory pot oven several hours. Metal forms, collects at the bottom, eventually solidifies. Pot is dumped, and the metal rolled into water. Thermal shock breaks it into irregular lumps small enough for hand cleaning to remove final traces of slag.

Excellent for most purposes, but completely brittle due to contamination by aluminum, iron and oxygen.

Chromium oxide reduction with metallic calcium

Mixture, including calcium chloride moderator, is heated in a closed steel bomb for 1 hour at 900°C. Mass is removed, leached with acid to dissolve byproduct calcium oxide and the product, a powdered metal, is dried.

This powdered metal product, considerably purer than metals made by above methods, has oxygen as its principal contaminant.

Chromium chloride reduction with metallic calcium

Similar to that used above.

Method proved difficult because oxygen free chromium chloride was in effect unobtainable.

Magnesium reduction of chromium chloride

Chromium chloride in a carrier salt of sodium-potassium chloride was deoxidized with carbon and chlorine and then cast under inert atmosphere into a chilled mold. Resultant mass, essentially an oxygen-free chloride, was reduced by magnesium in a helium atmosphere. Byproduct magnesium chloride and the sodium-potassium chloride carrier salt then distilled off in high vacuum.

Trace carbon contamination did not greatly affect metal ductility since oxygen level was as low at 10 parts per million. Although the metal could be hot rolled to sheet, the process did not lend itself to expansion in scale owing to unexplained explosions that frequently occurred in the final phases of the work.

Iodide dissociation

Specially purified chromous iodide is volatilized in a sealed glass or metal tube in the presence of a glowing tungsten filament. The iodide dissociates depositing pure chromium metal on the filament.

Metal crystals are very ductile but the method is not too readily adapted to commercial practice.

is not completely clean. Inclusions are presumed to be oxide with traces of carbide and nitride. Contamination may be estimated accurately by metallographic examination.

In fabricated forms best ductility is achieved only after removal of a few thousandths of an inch of metal surface by chemical or mechanical means. An 0.040 in. diam wire, as drawn, may show no measurable ductility. If the same wire is etched to 0.035 in. it may however, be rapidly reverse bent up to 50 times before breaking.

Availability of swaged rod from ingots of arc melted hydrogen reduced chromium permitted study of the tensile properties of chromium using recommended ¼ and ⅜ in. ASTM specimens. Previous work on nonstandard specimens ground from sintered electrolytic plate was of questionable significance.

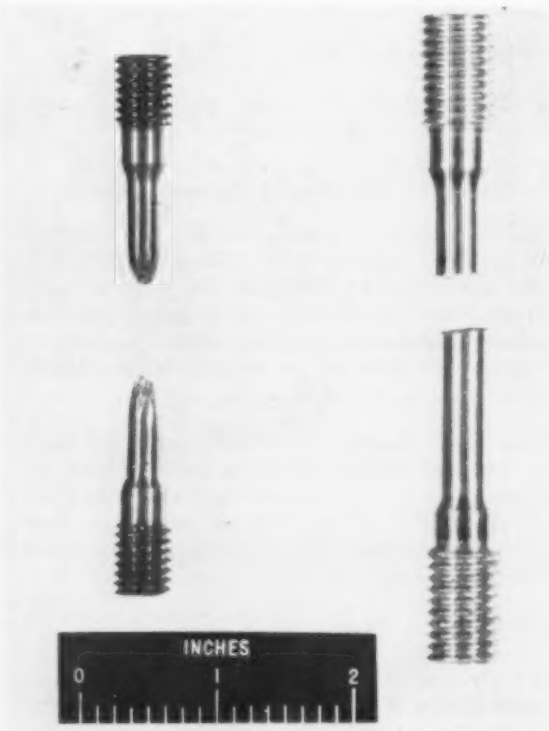
Values for the properties of chromium as a function of temperature were obtained from standard specimens. Values, Table I, are derived from data obtained in tests on these and others in a series.

Other values not included in the table, including compressibility, heat of fusion, electron emission, heat conductivity, magnetic properties and reflectivity are subject to question since the metal used in determining values commonly ascribed to chromium was probably inferior to that obtainable today.

At present there is an irregularity in the indicated tensile strength of chromium at room temperature. A ⅜ in. ASTM specimen broke at 12,000 psi at room temperature while a wire of 0.050 in. diam showed a tensile strength of about 127,000 psi. The abnormal strength often noted in wires is not the whole story as the wire showed elongation and reduction in area not found in the ⅜ in. specimen. Working probably had an effect in this case as similar behavior is noted in the sister elements tungsten and molybdenum.

Resists most acids

Chromium has in some instances shown such high oxidation resistance that laboratory analysis for carbon has been uncertain. Corrosion resistance of electrolytic chromium is one of its strong points. It resists normal acids other than hydrofluoric and hydrochloric. The corrosion resistance of rolled massive chromium should be even better because no porosity or surface irregularity would be present.



TENSILE SPECIMENS of chromium broken at room temperature and 500°C. Chromium is unusually strong at high temperature, brittle as glass at room temperature.

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Muller to coremaker—

Foundry Core Sand DELIVERED BY AIR

By E. J. Egan, Jr.
Machinery Editor

♦ Fast handling of prepared coremaking sand at a rate of 960 tons per two-shift day is all in the day's work for an unusual pneumatic system at Ford's Cleveland foundry . . . One operator, aided by light indicators on a central control panel, can watch the level of sand at each coremaking machine . . . Sand flow can be controlled by a system of switches.

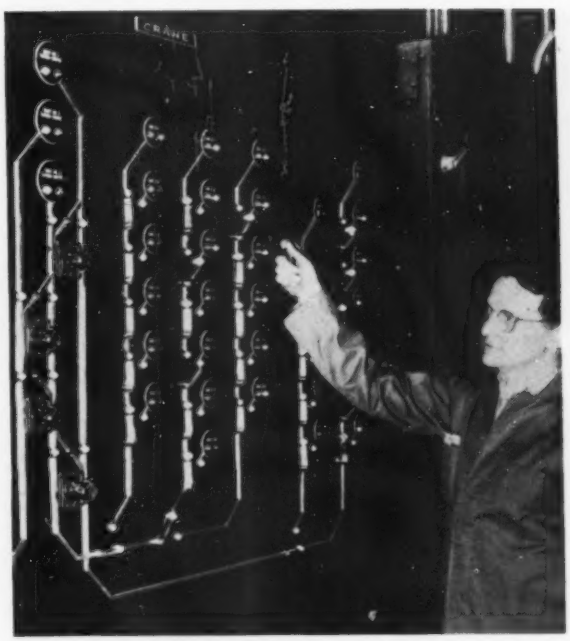
♦ Mullers mix 1-ton batches of sand every 4½ minutes on a continuous automatic cycle . . . Sand falls from the mullers into cone-shaped pressure chambers where compressed air fluidizes the sand . . . The sand moves out at high speed through a 4-in. pipe . . . No sand is moved by hand . . . The system saves space and insures a cleaner, safer plant.

♦ HUGE QUANTITIES of core sand are moved by air from preparation centers to coremaking machines each day at Ford Motor Co.'s Cleveland foundry. Ford engineers and equipment manufacturers have successfully provided an answer to the complex problem of handling large quantities of damp sand. To meet the tremendous demand for sand of the coremaking machines, a unique pneumatic sand handling system has been developed.

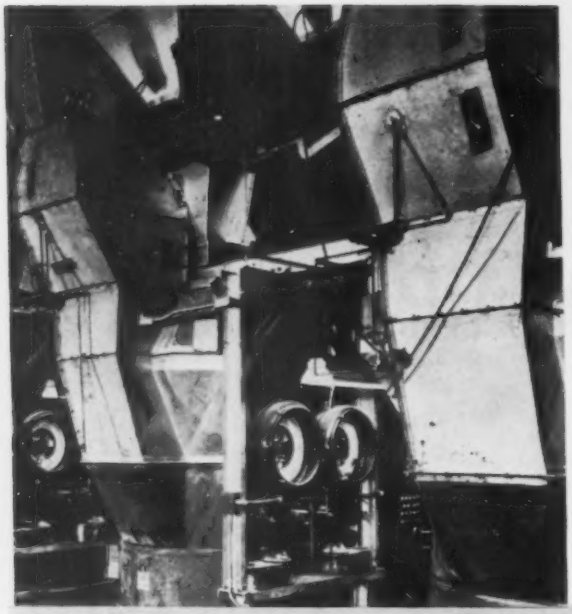
Sand, literally carried by air, moves through the foundry at high speeds and in huge quantities. Tons of mulled core sand are carried hundreds of feet under air pressure from 60 to 80 psi in a 4-in. steel pipe that goes up and down, around corners and through walls.

Coremaking facilities at the Ford plant consist of 11 production lines equipped with 84 coremaking machines. Cores produced range in weight from less than 1 lb up to 50 lb. Over 960 tons of prepared core sand are used in a normal 16-hour, two-shift day.

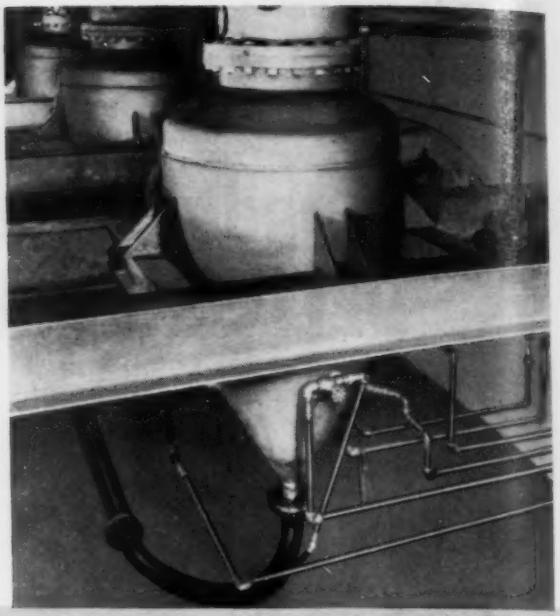
Not an ounce of prepared sand delivered to the coremaking areas is handled manually until the cores have been made. All handling is by automatic equipment controlled by operators through push button panels with a system of



LIGHTS ON CONTROL panel show sand levels in coremakers' hoppers, indicate positions of all switches in delivery system. From here operator can control entire sand distribution.



CORE SAND is prepared by automatic, push button set up. Each muller will prepare, automatically and continuously, a 1-ton batch of core sand every 4½ min.



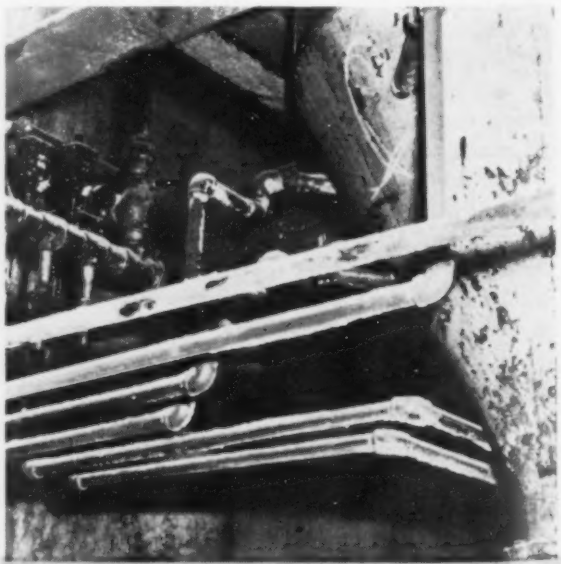
SAND DELIVERY units start with conical shaped pressure tanks with compressed air inlets around side walls and one at top. Four-inch pipe, bottom, carries prepared sand to hoppers.

signal lights and indicators to show position of the material at every step of processing. The pneumatic sand handling system is capable of delivering one ton of sand 400 ft in 70 seconds to any of 38 stations selected on the master control.

Preparation of the 1-ton core sand batches is an automatic, push button operation. A control panel serves each muller. To obtain sand, the operator sets controls which govern the amounts of core sand mix ingredients, muller operation, and muller discharge door for any one or all of the mullers. By pushing the automatic cycle button the muller or mullers go into operation and will mix batches continuously on a 4½ minute cycle until stopped by the operator. When the mixing cycle is completed, the discharge door is opened pneumatically to discharge the batch. The door is also closed automatically.

Prepared sand is delivered from mullers to coremaking machine hoppers and central storage bins by three pneumatic delivery units. These delivery units consist of conical shaped pressure tanks with compressed air inlets around the side walls and one at the top. A 4-in. pipe at the bottom of each tank carries the sand through various switches to the numerous coremakers' hoppers in the system.

The 1-ton batch of sand falls directly from a muller into one of the pneumatic delivery units. A door at the top of the pressure tank closes, forming an air-tight seal. Compressed air at 60 to 80 psi pressure, depending on the type of sand and blowing distance, enters the tank through six ¾-in. pipes. These are attached tangentially at equally spaced intervals around the side wall of the tank, but at different elevations and with one 2-in. pipe at the top of the tank. Purpose of these air jets is to fluidize the sand in the tank and carry the batch of sand out of the tank through the pipes to the delivery point selected by the muller operator. Selection is made on a push button panel equipped with red and green lights to show sand levels in coremakers' hoppers and



CORE SAND is fluidized by compressed air which enters the sealed delivery chamber through six ¾-in. pipes attached tangentially at different levels around side walls of the tank.

PREPARED CORE SAND falls from a muller into a pneumatic delivery unit. Six-inch diam air cylinder provides power to close top door of pressure tank to form air tight seal.

indicators to show position of all switches in the delivery system.

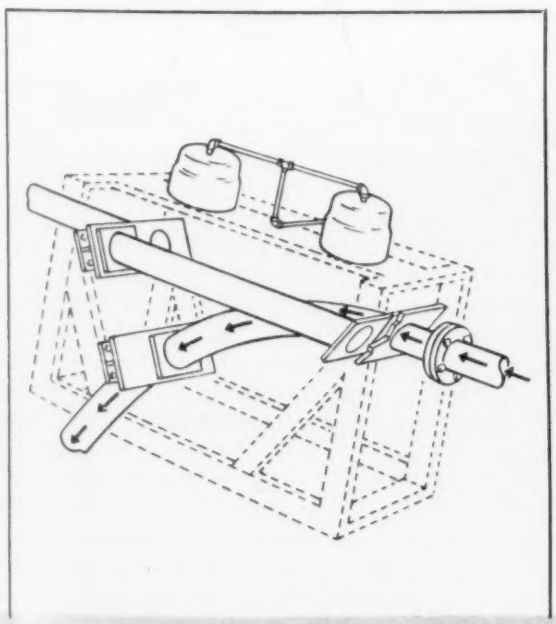
Switches in the system offer straight-through or diverted sand flow to feeder pipes or hoppers. Compressed air cylinder devices controlled by solenoids from the central panel operate and clamp the switches. Ends of the movable and fixed sections of switch piping have diagonal flanges. Rubber pads are mounted in the flanges of the fixed pipe sections to form an air tight seal at switch joints in the delivery system.

Sand delivered into hoppers servicing coremaking machines first passes through a baffle box about 7 in. wide, 20 in. long. This is equipped with four rubber baffles 6½ in. wide, 18 in. long and ¾ of an inch thick which hang down through slits in the box top. Sand entering one end of the box strikes the baffles and is deflected downward into the hoppers. Pressure of the sand also pushes each baffle against the next until they form an arched rubber lining, protecting the sand entry point. As sand continues to enter the box, some of it is held against the overlapping baffles. The balance of sand entering the box is deflected down into the hoppers. Sand hits against sand and there is little or no abrasion of the baffles.

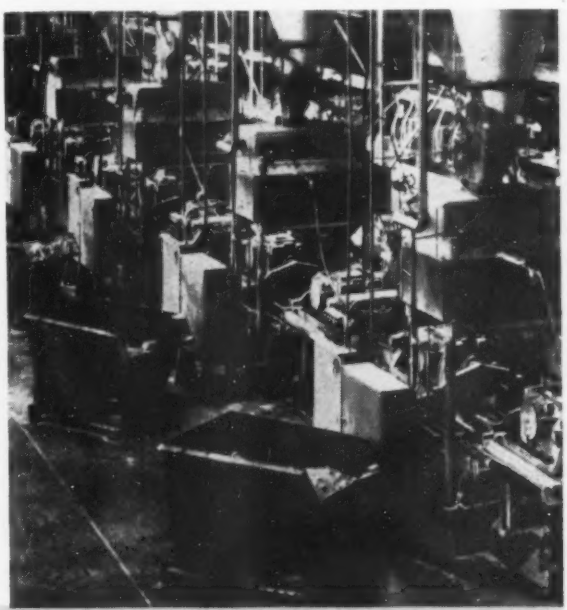
The first baffle receives the greatest wear because it is subject to the first onslaught of sand entering the box. Replacement of worn baffles is a simple matter, requiring only a few seconds. The worn baffle is removed from its slot and a new one inserted.

Sand is delivered by this pneumatic system directly to hoppers servicing coremaking machines on five lines. Sand for the remaining six lines is delivered by pneumatic conveyor to eight 2-ton capacity storage hoppers. From these storage units, it is delivered to the machine site by transfer cars mounted on a monorail.

This pneumatic sand handling system is an outstanding example of the application of compressed air at the Ford Foundry. Millions of cubic feet of air both at 100 and 125 psi are used throughout the foundry for coremaking, molding, cleaning, and other operations.



SWITCHES offer straight-through or diverted sand flow. Compressed air cylinder devices operate and clamp switches. There are 42 transfer switches throughout the installation.



SAND FOR SIX coremaking lines is delivered by pneumatic conveyor to eight 2-ton storage hoppers. From these hoppers it is delivered to machines by monorail mounted transfer cars.

Chips are thin—

How Does Titanium Machine?

By O. W. Boston
Chairman
Dept. of Production Engineering
University of Michigan
Ann Arbor, Mich.

Part I

◆ More and more engineers are asking 'How does titanium machine?' . . . To get a better answer to that question, University of Michigan research engineers, working on a Watertown Arsenal project, recently made a systematic study of factors affecting machinability of titanium.

◆ Preliminary machining by standard shop methods indicated unusually high feeding forces would be required . . . Chips were abnormally thin . . . Exceptional machine rigidity was required both to start and to sustain cutting.

◆ Later tests showed high unit pressures on cutting tools . . . Contact area between chip and cutting tool was very small compared with 18-8 stainless and a low-carbon steel under the same conditions . . . Temperatures at the tip of the cutting tool were higher and lack of a built-up edge tended to keep temperatures concentrated . . . There's less surface roughness from "smear."

◆ GROWING INTEREST in machining of titanium has spotlighted the need for basic machining data derived from titanium and its alloys. To obtain such data, The University of Michigan recently conducted extensive engineering tests on the machinability of titanium. The work, a project of the Engineering Research Institute, was planned by Watertown Arsenal and covered by a contract from the Detroit Ordnance District of The Armed Services.

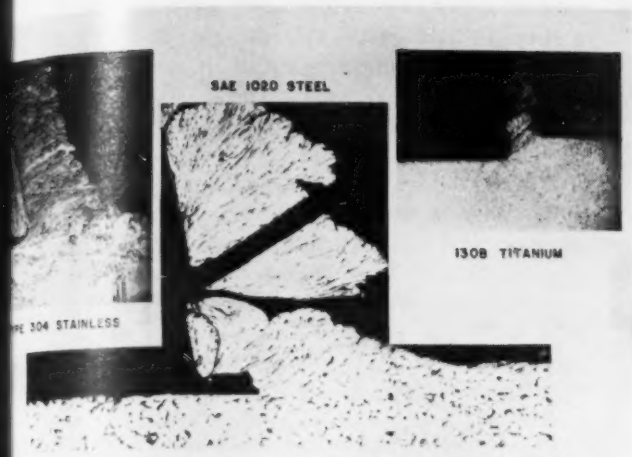
All major machining processes were studied. Work included research on chip formation, work hardening, surface finish, tolerances, cutting temperatures, and the nature of tool wear. High speed steel and carbide tipped tools were used in the tests on commercially pure titanium, Ti 75A, and the alloys Ti 150A, Ti 150B and RC 130B. Materials, Table I, were supplied by Watertown Arsenal as bars 2 x 4 x 16 in. and 1 x 4 x 24 in. SAE 1020 and 1045 steels and type 304 stainless were used for comparative studies.

Laboratory phases of the program were preceded by general attempts to turn, mill, shape, drill, ream, hacksaw, bandsaw, form-turn and part RC 130B titanium. Feeding forces required were unusually high and chips abnormally thin. Exceptional machine rigidity was required both to start and to sustain cutting.

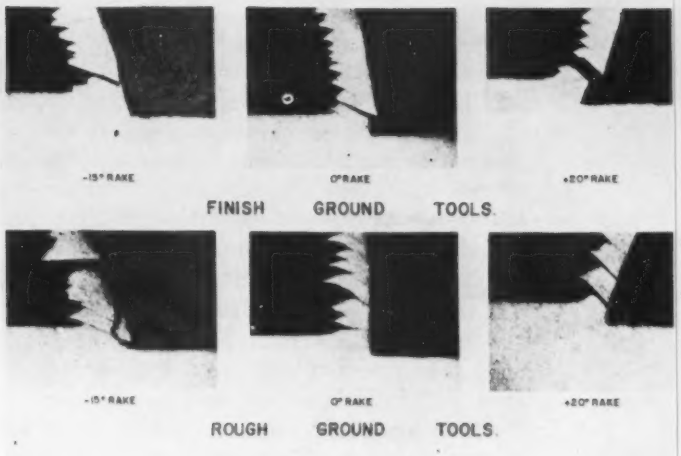
Next move was to get a better look at the type of chip formed. Chips were prepared using a shaper. Samples of 304 stainless, SAE 1020 steel and of RC 130B were used. The 3-in. long specimens were mounted in the vise so that the tool lacked about ½ in. of completing the full length of the cut, leaving the chip intact with the work piece.

In RC 130B a very thin chip is produced as compared with chips of 304 stainless and 1020 steel. There is a corresponding difference in the shear zone angle. Titanium shows a large angle relative to the direction of cutting while both the stainless and the SAE 1020 are cut with much smaller angles.

Of interest in a comparative test of this type is the work-hardening or distortion of the microstructure. No distortion is visible on the tita-



CHIP FORM left at end of 9 in. stroke on shaper at 9 strokes per minute, 0.005 in. depth of cut, 1/4 in. width of cut, for 304 stainless, 1020 steel, and RC 130B titanium. X50



TWO SETS OF TOOLS, one finish ground and one rough ground were used in shaper studies of chip formation vs. tool rake angle and surface finish for RC 130B titanium. X50

nium except in the chip and even that is pretty well localized in distinct cleavage lines. No distortion of the microstructure appears near the cut surface except at X1000. Distortion in the steels, however, is so great that it is difficult to recognize many features of the original structure in the chip. Initial slippage is evident in the stainless steel in some grains quite remote from the shear zone, indicating the extent and depth of penetration of the stress.

Based on these studies, tentative conclusions can be drawn from cutting of RC 130B titanium:

(1) Unit pressure on the tool will be higher.

(2) Temperature at the tip of the cutting tool will be higher.

(3) Surface roughness resulting from "smear" on the work surface will be less.

That unit pressure on the cutting tool will be higher is evident from the very small contact area between the chips and the cutting tool compared with those obtained with both 18-8 stainless and the low-carbon steel at the same size of cut and cutting conditions.

Two factors influence buildup of temperature at the tip of the cutting tool. Presence of a built-up edge with the steels reduces the temperature level before the heat reaches the cutting tool. Also, owing to the built-up edge, the heat is distributed over a considerably greater area of the tool face thus reducing the concentration of heat and the probability of destructively high temperature.

The conclusion that surface roughness resulting from "smear" on work surfaces will be less

TABLE I

PROPERTIES OF MATERIALS CUT

Materials	Composition, pct	Yield-Point Strength, psi	Tensile Strength, psi	Elongation in 2 in., pct	Reduction of Area, pct	Brinell Hardness
Ti 75A	Commercially pure	58,300	82,000	28	47	217
Ti 150A	Cr 2.7 Fe 1.3 Os 0.25 Ni 0.02 C 0.02 Ti Bal	131,400	140,500	25	55	302
Ti 150B	Cr 5 Fe 5 Mo 5 Ti Bal	150,000	151,800	14	18	311
RC 130B	Mn 4 Al 4 Ti Bal	139,300	155,200	18	42	331
SAE 1045 Steel, Hot Rolled	C 0.45 Si 0.27 Mn 0.70 P 0.02 S 0.02 Fe Bal	50,100	101,700	21.9	34	201
304 Stainless Steel	Cr 18 Ni 8 C 0.08 Max	.....	.....	.....	.....	260

is obvious since no smear metal appears on the cut surface.

Unstrained material of the 1020 steel showed a Tukon hardness of 130 while the built-up edge was hardened to an average of 426, an increase of 227 pct. Two separate regions of the chip showed average hardness numbers of 338 and 360, to give a 160 pct increase in hardness with increasing amount of distortion. Work hardening also showed in higher hardness readings to a depth of at least 0.016 in.

Hardness readings for 304 stainless averaged 260 for body hardness. The built-up edge averaged 494, an increase of 90 pct. The chip showed an average of 400 or an increase of 54 pct over the body hardness. For titanium RC 130B, body hardness average 376 while the chip averaged 551, an increase of only 46 pct. This compared to 54 pct for 18-8 and 250 pct for 1020.

Absence of a built-up edge makes the large shear angle a serious problem in view of high temperatures and pressures that can result. Since the presence of a built-up edge can reduce both temperature and pressure on the cutting tool, an attempt was made to induce one for this purpose even though some sacrifice in surface finish might have to be made.

Two sets of shaper tools representing a range of rake angles and two levels of surface roughness were prepared. Each set consisted of three tools. One set was carefully ground to a roughness level of 0 to 1.3 microinches. The second set was ground to a roughness of 30 to 50 microinches, about as rough as ordinarily accepted in a shop. In both cases, grinding marks were parallel to the cutting edge to exert maximum influence on pressure welding.

All chips produced by these tools were segmental like those produced earlier by RC 130B titanium. The attempt to produce a built-up edge failed, at least in the sense that a built-up edge is retained. But note that something comparable to a built-up edge was trapped at least momentarily with the — 15° rake rough-ground tool. It is not believed this persisted for any significant period of time although it may have occurred quite frequently, but perhaps only in a partial state of development.

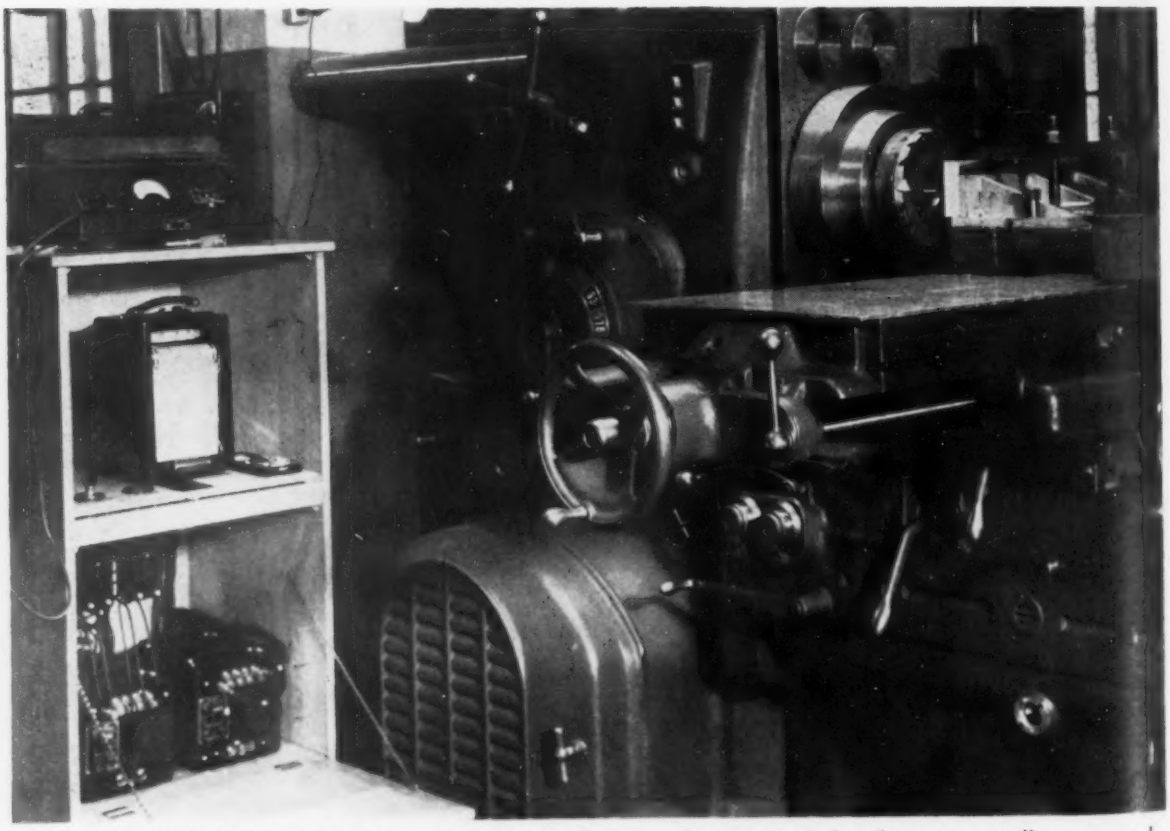
Shear-cleavage surfaces occur at least once in every chip, of those examined, except in those obtained with the 20° rake tools. These surfaces are oriented obliquely relative to the underside of the chip, as shown in Table II.

The widely different roughness between the two sets of tools did not produce any appreciable change in the effective coefficient of friction. However, there is an obvious difference in the frequency and pitch of the cleavage surfaces, indicating that the difference in roughness did exert some influence. It is difficult to

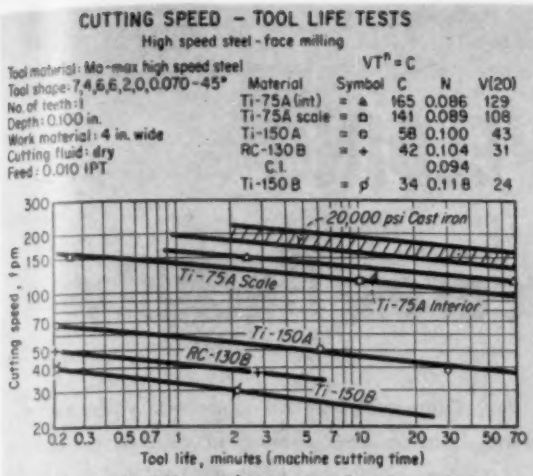
TABLE II

SHEAR ANGLES, RC 130B TITANIUM

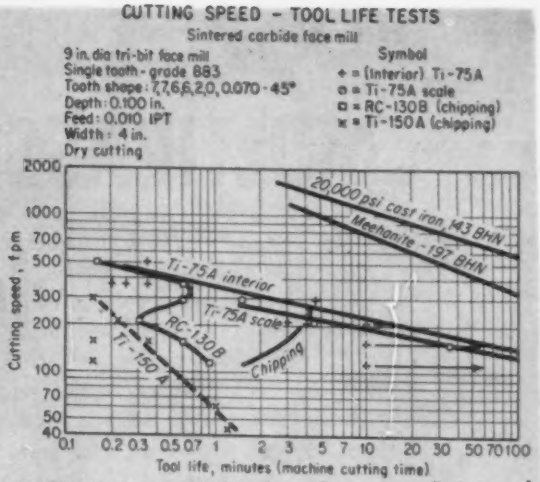
	Rake angle		
	—15 deg	0 deg	+20 deg
Smooth-ground tools	22	31	42
Rough-ground tools	22	29	43



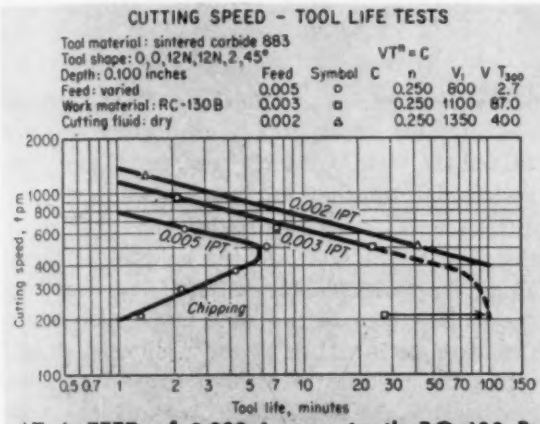
FOR FACE MILLING, a Milwaukee model 5HM milling machine with 20-hp drive to spindle was used.


CUTTING SPEED – TOOL LIFE TESTS
High speed steel - face milling
Tool material: Mo-max high speed steel
Tool shape: 7,4,6,6,2,0,0.070-45°
No. of teeth: 1
Depth: 0.100 in.
Work material: 4 in. wide
Cutting fluid: dry
Feed: 0.010 IPT
VT^n = C
Material Symbol C N V(20)
Ti-75A (int) = ▲ 165 0.086 129
Ti-75A scale = □ 141 0.089 108
Ti-150A = ○ 58 0.100 43
RC-130B = + 42 0.104 31
C.I. 0.094
Ti-150B = ◇ 34 0.118 24
20,000 psi Cast iron
Ti-75A Scale
Ti-75A Interior
Ti-150A
RC-130B
Ti-150B
Cutting speed, fpm
Tool life, minutes (machine cutting time)

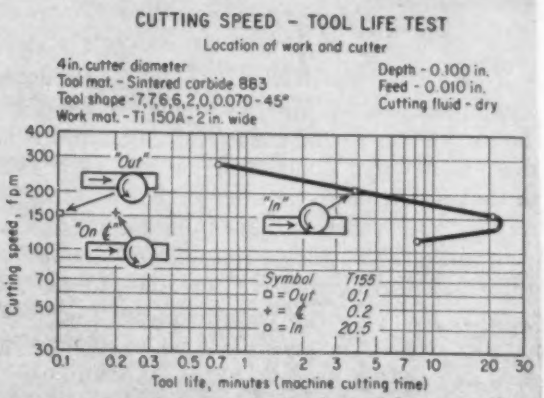
COMPARATIVE machining studies based on use of high speed steel face milling cutters.



IN SIMILAR STUDIES, based on use of sintered carbide in face milling, some chipping occurred.



AT A FEED of 0.002 in. per tooth RC 130 B could be machined without chipping the carbide.


CUTTING SPEED – TOOL LIFE TEST
Location of work and cutter
4 in. cutter diameter
Tool mat. - Sintered carbide 883
Tool shape - 7,7,6,6,2,0,0.070-45°
Work mat. - Ti 150A - 2 in. wide
Depth - 0.100 in.
Feed - 0.010 in.
Cutting fluid - dry
"Out"
"In"
"On ℄"
Symbol T155
□ = Out 0.1
+ = ℄ 0.2
○ = In 20.5
Cutting speed, fpm
Tool life, minutes (machine cutting time)

IN FACE MILLING, cutter lasted longest when work was below center of the cutter.

comprehend how this could be effected except through a change in either the level or the behavior pattern of friction.

In face milling tests, high speed steel and carbide tipped tools were used. The titanium bar was clamped in a rigid fixture to present the 4-in. face of the 18-in. long bar on the centerline of the cutter. Gross and tare power and surface finish were measured.

The 5HM horizontal milling machine was equipped with a 20 hp motor to drive the spindle and a separate 5 hp motor to provide the feed to the table and rapid traverse. The cutter was a 9-in. diam face mill with one inserted blade. The relation between the cutting speed and tool life when using a single high speed steel blade was establish for several materials.

Values for 20,000 psi cast iron were established for comparison. Cutter life was based on flank wear of 0.030 in. When a tooth tipped with a grade 883 sintered carbide was used, with practically the same shape as that of the high speed steel tooth, a new relationship between cutting speed and tool life for the 0.010 in. feed per tooth was established.

Chipping of cutting edges occurred to divert the lines from the normal slope as shown for the Ti-75A interior, and the RC-130B alloy. It was later found this feed was too high and that the material could be machined satisfactorily when the feed per tooth was reduced to 0.002 in. per tooth. Chipping occurred at the lower speeds for higher values of feed.

In face milling, the cutter gave the longest life when the work was placed below the center of the cutter. Chipping, caused by the chip alternately welding to and breaking from the edge of the tool, is greatly reduced by approaching zero chip thickness where the cutter leaves the work, when milling titanium with carbides. Both 4-in. and 9-in. diam face-milling cutters gave best performance when using the "in" cutting so as to give zero chip thickness at the end of the cut.

Relief angles had no major effect on the life of the face mill with carbide or high speed steel tools. The larger angles up to 17° normal relief give longer tool life than the smaller angles when machining at the lower speeds. A large peripheral-cutting-edge angle or chamfer gives the longest life of the carbide cutter when face milling T-75A metal, cutting dry. Cutting speed for a 60 minute tool life was increased, from 360 fpm for the 0 peripheral-cutting-edge angle, to 440 fpm for a 45° side-cutting-edge angle when the 883 carbide was used to face mill, dry, the Ti-75A metal at 0.005 in. per tooth.

Grains get smaller—

MULTIPASS WELDING Increases Ductility

Maj. F. W. Myers, Jr.
U. S. Army
Arlington, Va.

◆ Refinement of weld grain structure by repetitive heating and cooling in multipass welding produces many desirable characteristics—both metallurgical and physical . . . Hardness decreases and ductility increases with each succeeding pass.

◆ IN METAL ARCWELDING, the arc reaches a temperature as high as about 10,000°F in the arc column. Plate material adjacent to the weld is affected sufficiently by the high heat so that its structure is altered. The weld metal may vary in structure, depending on base metal composition, electrode composition, amount of diffusion, heating and cooling rates and other factors. All of these metallurgical effects occurring in a single-pass weld are modified with each succeeding pass in multipass welding.

At high arc temperatures, the electrode melts in a fraction of a second, permitting deposits to be made very rapidly. Without this rapid action, overheating, carburization and possible splashing of the liquefied mass would result. Almost instantaneous melting of the base and filler metal is followed by rapid cooling due to heat being drawn off by the mass of surrounding metal. It is during this cycle that chemical and metallurgical reactions take place.

Metal transferred from the electrode to the base metal by the arc is subject to nitrogen pickup which can affect the physical properties of the weld. Magnetic arc blow is another factor which may have an effect on the deposited metal. A particular welding technique is often necessary to eliminate weld defects due to arc blow.

The amount of stress resulting from transverse shrinkage in a butt joint is still another factor to consider. It is a function of the successive molten pools formed in making the weld deposit. In a butt weld, the base metal is stress-free only at the very start of the weld. With each addition of filler metal, stress and subsequent shrinkage increase. These stresses can in some cases, if not properly controlled, exceed the yield point of the material and cause plastic deformation and cracking.

Transverse stresses usually increase proportionately to the width of the heat-affected zone along the seam. The transfer of the heat from the molten pool to the base metal also affects the ultimate strength of the weldment since it alters the metallurgical structure of the base materials in the heat-affected zone. Welds made by manual metal arcwelding, generally produce a relatively coarse-grained structure.

Width of the heat-affected zone, as well as the temperature reached, is a function of the arc effect, current value used, and the heat gradient which depends on the base material thickness. To reduce as much as possible the formation of a coarse-grained structure, multipass welding may be used. This technique has the advantage that the previously deposited beads are annealed and refined by the subsequent deposits. Refinement of the weld grain structure produces many desirable characteristics, metallurgically and physically.

Some electrodes contain special chemicals in the coating to produce desirable reactions insofar as obtaining additional heat input is concerned. These help to keep the weld metal in a molten state even after the arc has been moved from an area of a deposit. This influence on metallurgical qualities is favorable.

A study was made to determine the metallurgical changes that occur in multipass butt welds. Five weld beads, deposited with 3/16-in. diam Class E-6013 electrodes, were made in the down-hand position. No preheat or postheat treatments were given to specimens tested. Maximum interpass temperature of 200°F was maintained during welding.

MAJOR MYERS, welding engineer, has done extensive research work in government service and as a member of technical committees. His articles have appeared in The Iron Age since 1946. His opinions do not necessarily reflect the views of the U. S. Army.

Current values for the weld beads were:

Bead	Amperes	Volts
1	165	21
2	165	21
3	180	22
4	175	21
5	170	20

The completed butt weld was sectioned longitudinally and a 2X macrograph taken of the sectioned weldment. The macrograph shows in the last section of weld where the five weld beads are completed, a number of zones of structure change.

Vickers hardness readings were taken on four sections of the test weld. A 10 kg load was used and readings were taken at 0.03-in. spacings. The plain-carbon steel backing strip had a relatively low hardness compared to the weld metal. Values taken in specimen No. 1 of the weld metal, composed of base metal and one weld bead, show that the average hardness of 277 Vhn was fairly high.

Grain size gets smaller

As the number of beads deposited increased, the hardness decreased to the point where the average hardness value for specimen No. 4 was 213 Vhn. In the first pass, a relatively coarse-grained structure resulted in the weld metal and adjacent area. When successive beads were deposited, these coarse grains were refined as the temperature was raised through 1650°F.

The average grain size in a multipass butt weld will be much smaller than in a single-pass weld of a similar size. From this it can be deduced that if all other factors are equal the multipass weld will have ductility superior to that of a single-pass weld. This may also explain the difference in hardness values.

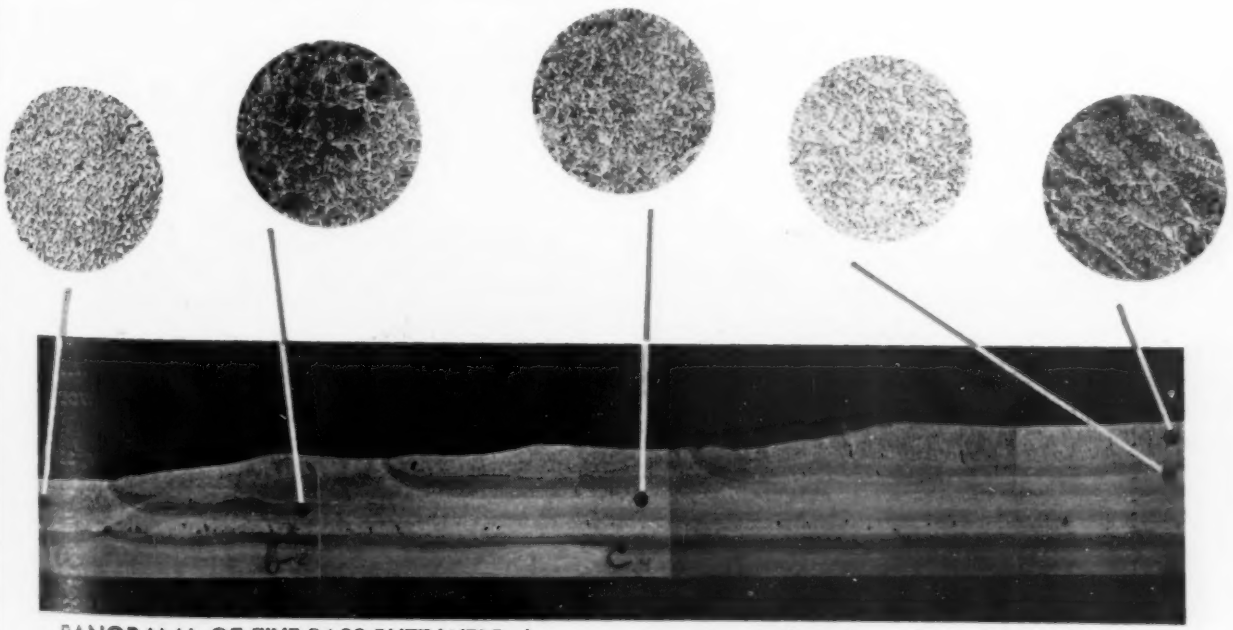
The phenomenon of the grain refinement occurring in a multipass weld can be explained by the heating and cooling cycles which occur. The first pass in the as-deposited condition consists of a relatively coarse-grain structure, both in the weld metal and adjacent area.

By depositing a second bead, after the first bead has cooled below 1328°F, the coarse grains in the first bead are refined as the temperature of the bead is raised through 1650°F by the advancing second bead. Each coarse alpha grain in the first bead heat-affected zone changes to numerous fine gamma grains. These grow under the influence of the adjacent weld metal.

Should have better ductility

During cooling, the gamma grains in the first bead transform at 1650°F to still finer alpha grains. These are finer than the corresponding alpha grains of the second bead because the gamma grains growing from the weld metal are far larger than the gamma grains that sprouted from the alpha grains of the first bead.

In a two-pass weld on mild steel plates, the structure consists of a fine-grained lower bead and a coarse-grained upper bead. The average size of grains will be much smaller in a two-pass weld than in a single-pass weld of the same size. Consequently, multipass welds of two or more beads should have superior ductility. When a weld is made in more than two passes, a proportionate increase in fine-grained material results from the repetitive cycle to which welds of more than two passes are subjected.



PANORAMA OF FIVE-PASS BUTT WELD shows various structures resulting from repetitive heating and cooling of weld metal. Heating through successive cycles refines the grain structure, reducing weld hardness and increasing ductility. Single-pass structure is at the extreme right.

Multiple tapping—

Cored Holes In Castings
TAPPED FASTER, CHEAPER

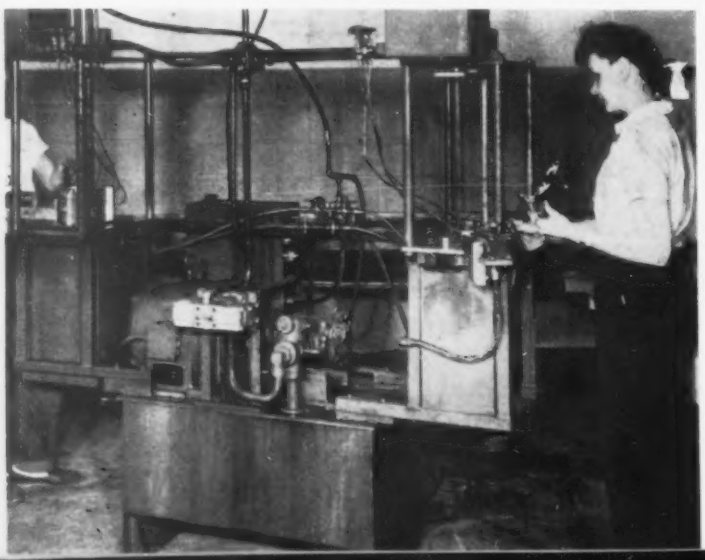
By W. G. Patton
Assistant Technical Editor

◆ Hydraulically powered rack and pinion setups drive special lead screw-type taps on a unique multiple tapping machine . . . Designed and built by Ajax Mfg. Co., Detroit, the machine eliminates one-at-a-time tapping of cored holes in castings . . . Using a single clamping fixture, 4 or more holes can be tapped simultaneously . . . Production rates on die-cast parts have hit 900 per hr.

◆ Multiple tapping cycle is automatic once the part has been located in the fixture . . . Holes to be tapped need not be in the same plane, may even be on opposite sides of the casting . . . Accuracy is maintained by high machine rigidity and by grinding lead screws to match taps . . . Smoothness of operation keeps tap breakage at a minimum.

◆ PRODUCTION TAPPING of diecast parts with several cored holes has often been hampered by the necessity of tapping holes one at a time, using an individual fixture for each operation. For each hole this involved: (1) Placing the part in the fixture; (2) clamping; (3) tapping; (4) unclamping; and (5) removal of the part.

THIS MULTIPLE TAPPING machine automatically taps die cast hood ornaments. Floor button microswitches start the tapping cycle.

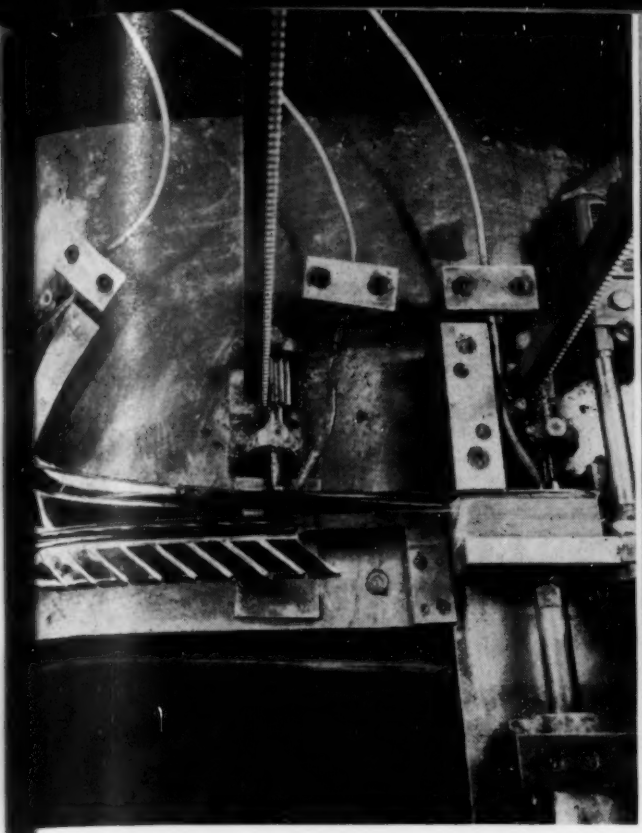


Any effort to combine two or more tapping operations on a clutch-type machine requires perfect synchronization. Fixture expense is high, and there are often space limitations to be considered. Simultaneous tapping of holes not in the same plane is another frequent problem.

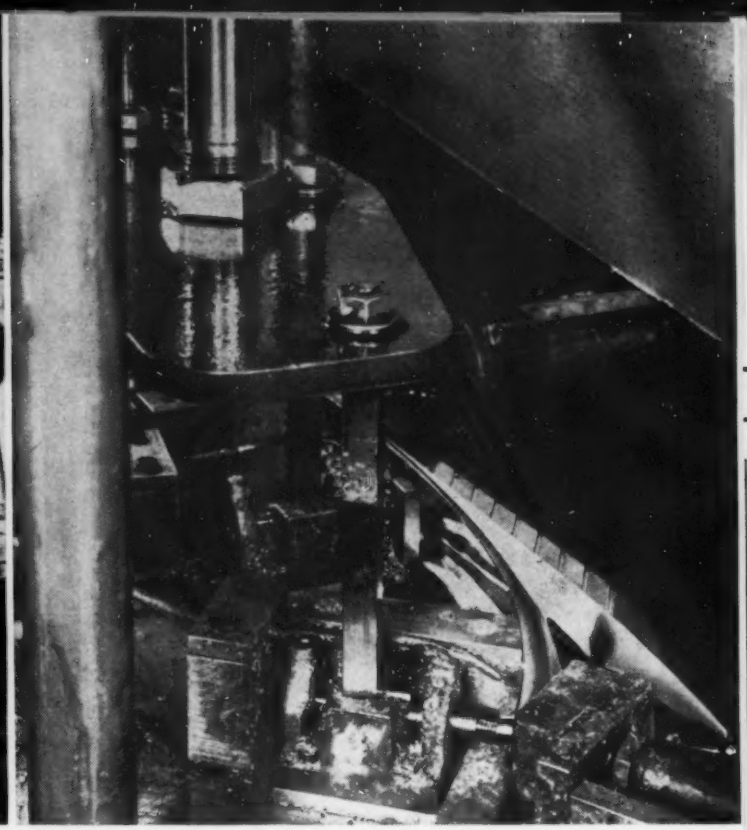
An automatic, hydraulic machine, designed and built by Ajax Mfg. Co., Detroit, uses racks and pinions to revolve special lead screw taps, and permits simultaneous tapping of 4 or more holes during a single clamping. As soon as the part is properly located in the fixture, the machine operator steps on a floor button to actuate a microswitch. This starts an automatic cycle of clamping, tapping to desired depth, rapid withdrawal of the taps, and unclamping of the workpiece.

Cost of the single clamping fixture is low, and the fast automatic sequence of operations has made it possible to multiple-tap as many as 900 die castings per hr.

Accuracy in such rapid tapping is assured by: (1) The extremely rigid machine; (2) accurate grinding of the lead screws to match the taps; and (3) always locating on the core side of the part which is not subject to dimensional change during processing. Depth of tapped



CLOSEUP OF RACKS and pinions driving 3 lead screw taps simultaneously. Air cylinders clamp the die casting in the locating fixture.



RACKS are attached to the movable plate. Holes to be tapped need not be in the same plane or on the same side of the part.

holes can be held within 0.001 in. it was found.

If desired, holes on the inside and outside of the part can be tapped simultaneously. Holes at compound angles can also be tapped during a single stroke of the machine, either by modifying the standard rack, or by tipping the part slightly in the fixture. Spindle can be extended to reach deep cored holes, and fixture plates can be mounted to permit tapping from an overhead position.

The problem of synchronization has been eliminated by mounting the racks and pinions on a single plate or on several plates which are actuated simultaneously by a compound hydraulic cylinder. Racks and pinions are in contact at all times during the up and down strokes of the machine. This positive action causes the taps to feed and withdraw simultaneously and smoothly, without binding in the holes. There is no opportunity for the machine to get out of phase.

As shown in the accompanying photographs, all taps can be mounted on a single plate for some multiple tapping operations. As the pinions revolve in contact with the racks, the taps and lead screws turn the same number of revolutions as the pinions. Taps move forward and backward at the same rate as the lead screws.

To shorten the automatic cycle, taps are withdrawn from the holes at twice the feed rate. This is accomplished by using a differential power cylinder.

The machine's hydraulic system eliminates surge and provides a smooth, positive action with no dwell time at the bottom of the stroke. Operating pressure of 300 to 400 psi is maintained by a pump of 18 gpm capacity. Tapping speed can be varied by restricting the cylinder volume.

Castings are clamped in the fixture by a comparatively light air pressure of 30 lb. As the automatic cycle begins, forward pressure of the taps helps to hold the part in position. The microswitch to actuate the tapping cycle will not operate unless the part is accurately positioned in the fixture. At the bottom of the machine stroke, a limit switch operates to retract the movable plate and simultaneously withdraw the taps.

Experience at the Ajax plant indicates tap breakage on the multiple tapping machine to be much less than would have been the case if holes were individually tapped. The company has tapped over 5 million holes in a 7-month period, using 6 of its machines. Breakage was less than 300 taps.

Multiple tapping machines built by Ajax thus far have had strokes ranging from 14 to 24 in. Holes have been tapped to a depth of $\frac{3}{4}$ in. A thrust of approximately 1200 lb enables the machine to tap multiple holes in zinc and aluminum-base diecastings, as well as sand and permanent mold castings of brass and bronze. Up to the present time, however, the company's production experience has been limited to diecastings.

Buffs get aired—

Automatic Setup Buffs In

James E. Taylor
Moving Coordinator
The Black & Decker Mfg. Co.
Hampstead, Md.

◆ Complicated aluminum castings, at first considered too difficult to buff automatically, are now being buffed automatically with good results . . . After setting up for a portable saw case, The Black & Decker Mfg. Co. now buffs 22 different aluminum castings automatically.

◆ In passing around a table, each casting is repositioned a number of times until buffing is completed . . . Special ventilated buffs permit use of higher speeds and greater pressures . . . Ratchet mechanism feeds buffing compound automatically.

◆ PORTABLE ELECTRIC TOOLS are made by The Black & Decker Mfg. Co., Towson, Md., in nearly 150 different models, plus several thousand accessories. Tools in the industrial line are not highly polished, but those ending up on counters of hardware, department and specialty stores are buffed and colored to give them eye appeal.

One of the tools in the consumer line, an 8-in. portable saw, has a complicated aluminum housing which seemed to defy automatic buffing. This casting has about a 5-in. diam and is 6½ in. long. Despite its many projections, B & D believed that most of this casting could be buffed automatically.

The first step was to find an automatic buffing machine large enough and rugged enough to do the job. After looking over several buffing installations in other plants, a manufacturer of buffing machines redesigned a standard machine to B & D specifications. The new machine, besides doing continuous straight-line buffing, also rotates intermittently.

The next step was to determine the proper buffing speed. The ideal speed would be one at which buffs would not mush, the least buffing compound would wipe off, and the buffs would cover the most surface without pulling or distorting holes in the casting. After testing speeds from 400 to 2400 rpm with a number of different size buffs, the best combination was found.

In setting up the machine, the saw case had to be turned many ways to be completely buffed. It was also necessary to use several buffing heads to do the job.

Another problem was that of establishing a procedure for the operator. An operator working at the mouth of the machine advances the castings from one jig to the next until a casting has been repositioned the required number of times to complete the buffing. He then takes out the finished casting and puts in a new one.

As each casting passes around the table, it comes in contact with a buff held by a spindle. Specially-constructed ventilated buffs made by Hanson-Van Winkle-Munning Co. are used for this operation. Spindles are set under springs which permit the buffs to ride the casting passing beneath them. A motor drives each spindle, and a ratchet mechanism automatically feeds buffing composition to the spinning buffs.

The operator works beside a panel board from which he may start and stop each head,

ffs Intricate Aluminum Castings

the table, or the spindles. He may also raise or lower the heads, or stop the entire operation.

After all optimum operating conditions were determined, essential data were recorded so that the machine could be used for other jobs, then reset at any time for buffing the saw case in precisely the same manner as before.

A number of makes and varieties of compositions and buffs were investigated before selections were made. By using a cost per piece method and maintaining standard quality, compounds and buffs were selected which give greatest economy.

Previous experience at B & D has been in buffing small aluminum parts such as knobs, cover plates and similar items. After investigating automatic buffing operations further, B & D realized the importance of sanding prior to buffing. Considerable information was gathered on rates, break-even points on belt length, types of belts and flexibility. With this information, sanders were designed and good results obtained. The best grit and time are determined by the particular sanding operation.

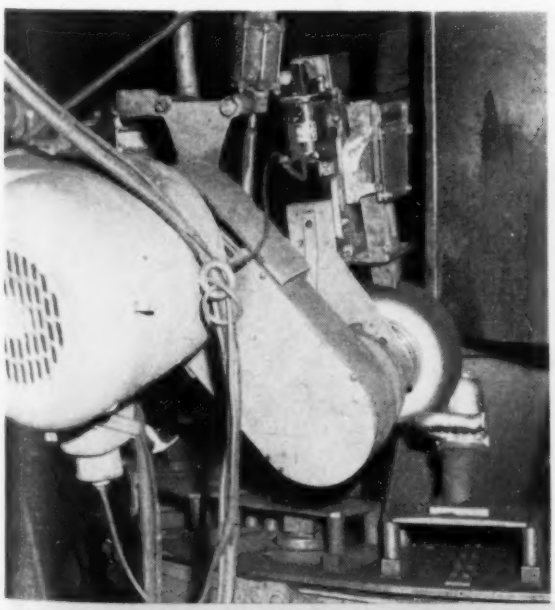
Most of the saw case is buffed on the automatic machine, but spots in and around the handle which could not be reached by the automatic machine are finished by hand buffing. Two hand buffing machines are usually used for this operation. Buffs used here are also Ruff-L-Buffs.

After hand buffing, castings are given a thorough cleaning. Parts to be cleaned are placed in a basket and carried from the hand buffing machines to the washer.

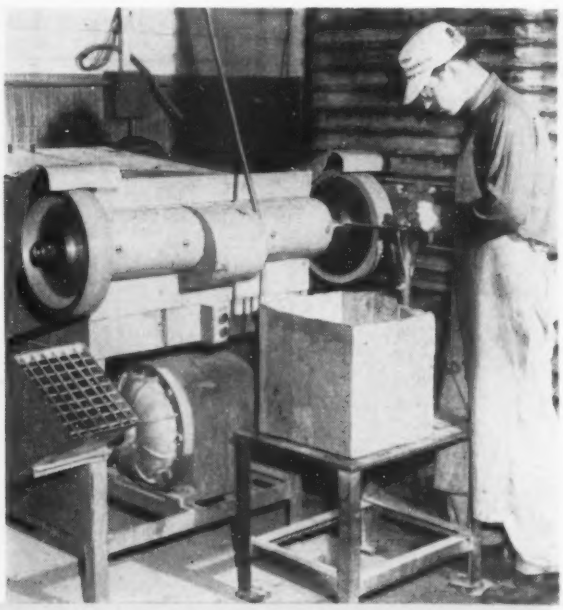
One operator, stationed at the front end of the washer loosens the bolts on the saw handle and places the castings on the belt conveyor feeding into the washer. Another operator, stationed at the far end of the washer, receives the washed castings, tightens the bolts and places the castings in the mobile basket.

The purpose of loosening the bolts is to permit the alkali bath to clean out any grime caught in the handle. After washing, castings are heat dried. Any water remaining inside the unit is blown out by compressed air. Castings are then carried to the coloring buffs.

Buffing specifications are followed rigidly to get consistently good results. When several



PORTABLE SAW CASES pass around table of automatic buffing machine as buff rides over the aluminum casting. Ratchet feeds compound.



BELT SANDERS aid considerably in preparing surfaces for buffing. Each machine is specially designed for particular sanding jobs.

pieces make up the finished tool, each piece is polished to the same degree of brightness. Otherwise, the assembled tool would look like a patched quilt. Pressures of the buffs on the automatic machines are a point of major concern because an ear can be knocked off an ordinary aluminum casting without too much force.

In addition to damaging the casting, high buff pressures may cause excessive heat. Too little composition applied to the buff may also cause high heat. By using ventilated buffs, B & D has had no difficulty along this line. Experiments have shown that the ventilated buffs can withstand higher temperatures and pressures than ordinary buffs.

When two or more buffs are combined to make up a buffing wheel, ventilating air enters the wheel through holes in fiberboard centers of the buffs. As the wheel rotates, centrifugal force drives the air through 12 channels between each buff to the cloth portions of the buff. Numerous ruffles distribute the air over the buff side and channel it through the wheel, cooling it as it rotates.

Ventilation makes it possible to operate wheels at higher speeds and to apply greater pressure between the work and the wheel. The result is faster buffing with less buff wear. This feature also requires less buffing composition since the composition binder is not volatilized by excessive heat.

Cloth used in making the buffs is cut diagonally to the threads. This bias construction exposes to the work the maximum number of thread ends, thus getting more cutting action per revolution. Since cloth cut on the bias does not ravel, buffs wear longer. There is also less lint, and therefore, less buffing composition is wasted since less of it is discarded with the lint.

Besides the saw case, B & D now cuts and polishes more than 22 different aluminum castings. It has installed several automatic machines with multiple buffing heads. Each buffing machine has a dust collector attached to it.

HAND BUFFING removes spots around the handle where automatic buffs do not reach. In this operation, the castings are being colored. From here parts move in baskets to a washer.

PANEL BOARD near operator permits easy operation of buffing machine. It will start or stop each head, table or spindle. It also controls raising and lowering of heads.

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Technical Briefs

Testing:

Plant develops unusual high pressure testing unit.

High pressure pneumatic testing has always presented problems. Equipment usually involves high cost and consumes large areas of factory space. Problems of efficiency and safety must be given special attention.

These problems arose when Herman Machine & Tool Co., Tallmadge, Ohio, received an order for small diameter pneumatic cylinders. Cost and delivery of existing high pressure equipment led company engineers to develop their own equipment.

The special equipment which they designed and built combines simplicity and effectiveness with low cost of operation and minimum of maintenance.

Connected Individually

The Herman testing equipment consists of a suitable steel stand with a Plexiglas cover in which cylinders are placed for pressure and leakage tests.

Each cylinder is connected with a supply of nitrogen gas through valves and gages in a manner that permits replacement, of any one cylinder at any time.

The high pressure phase of the problem was solved by inter-connecting nitrogen gas with a closed hydraulic system. A control system, actuated by solenoid valves and mercury switches, returns the oil to storage and delivery tanks for use in the next compression cycle.

This method eliminates refilling and waste, and simplifies the operation and maintenance of the system. it is possible for all testing operations to be conducted by one person.

High and Low Pressures

Cylinders are placed in the test stand, preset and locked into place by a comparatively low pressure. When all cylinders are properly seated, high pressure is applied. The high pressure leakage test subjects cylinders to a pressure of 3200 psi for 5 minutes.

After the cylinders have passed the short duration high pressure test, they are placed in a similar rack and subjected to a pressure of 1600 psi for 4 hours. The pressure may not exceed 25 psi drop during the 4-hour test period.

Random Burst Test

A random burst test is required where the cylinder is placed in a cylindrical steel shell with a Plexiglas cover, and is subjected to a hydraulic pressure of 10,000 psi. Bursting pressure requirement is 6400 psi.

Testing equipment required to meet such rigid specifications must operate with the utmost efficiency, be safe, dependable, economical, and as compact as possible. The present equipment was designed to test units at and above specifications.

Pressure test unit . . .

IF YOU WANT MORE DATA

You may secure additional information on any item briefed in this section by using the reply card on page 67. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

Machining:

Rough boring of stainless tubing made easier.

Outstanding production results on rough boring applications of stainless steel tubing with standard clamped tungsten carbide insert boring heads have recently been reported by one of the Pacific Coast manufacturers of stainless steel castings.

Tubing, 74 in. in length, ranging in outside diameter from 3 to 13⅛ in. and inside diameters from 1¾ to 11⅞ in. is now easily being bored in one cut on medium-duty standard engine lathes.

Assure True Bore

Tungsten carbide inserts, H-type Kennametal K2S are secured in the boring head with heavy steel spring clamps and buttonhead clamp screws. Tungsten carbide wear pads on the boring head's outside diameter are used.

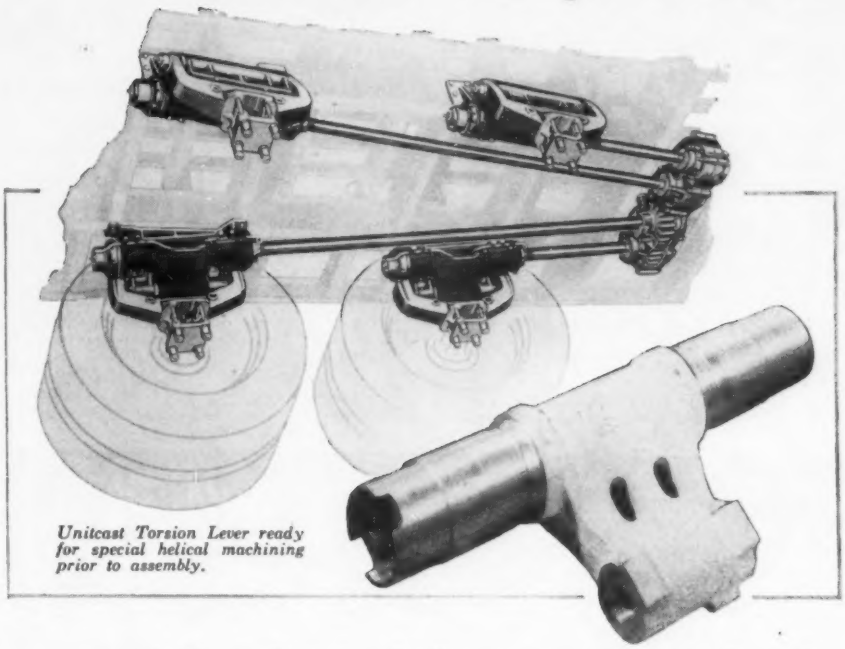
These guide the head during the cut to assure a true bore. Boring bars utilized are made of Shelby tubing through which suitable coolant is forced under high pressure to wash away chips ahead of the cut.

Job Descriptions

Operational data from two of the most typical tube boring jobs include: On the first job cast stainless AISE type 420 steel tubing of 9-in. outside diameter by 3-11/16-in. inside diameter is rough-bored on its inside diameter to 4 in. on

LEWIS
TRAVEL-CUT
automatic, high-speed
heavy-duty
WIRE STRAIGHTENING
and
CUTTING MACHINES
Sizes for .012" to ¾" WIRE
ROUNDS & SHAPES
THE LEWIS MACHINE CO.
3450 E. 76 ST., CLEVELAND, O.

Unitcastings solve tough torsion lever problem!



Unitcast Torsion Lever ready for special helical machining prior to assembly.

..good foundry technique = good castings!

With a primary objective of producing matched pairs . . . *and producing them right*, this Torsion Lever proved a healthy challenge to foundry engineering. End use of this main link between the torsion springs and the axles requires finished castings that are sound, accurate and physically dependable.

Unitcast solved the problem by perfecting a molding procedure especially for this particular job. Individually controlled and synchronized operations produce steel castings "constantly high in quality". As to cost factors . . . delivered, the castings require *no preliminary* machining . . . and one important fit surface is held within tolerances that require *no finish machining at all!* Accepted production to date . . . *over 350,000 units*, is high recommendation of Unitcast's foundry technique!

Are you missing "constantly high quality"? Let Unitcast analyze your parts problems . . . there's no obligation. And, all inquiries we receive for new designs are kept in strictest confidence.

UNITCAST CORPORATION • Toledo 9, Ohio

In Canada: CANADIAN-UNITCAST STEEL, LTD., Sherbrooke, Quebec

Unitcast

QUALITY STEEL CASTINGS

Carbide inserts on boring heads speed output . . .

an Axelson 18-in. medium-duty lathe.

Boring head used has standard Kennametal Grade K2S clamped inserts. Job is handled at 0.010-in. feed, 160 sfm at a 5/32-in. depth of cut (one side) in 55 minutes machining time.

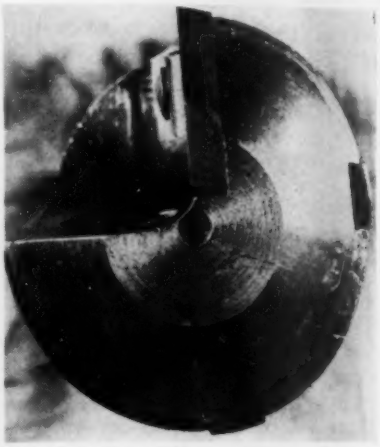
Parallel Chipbreaker

Their second job is a rough boring to 3⅛-in. of the inside diameter of cast stainless AISE type tubing 6 3/16-in. outside diameter by 2⅝-in. inside diameter on an 18-in. engine lathe.

Tooling used is standard Grade K2S clamped inserts having a paralled chipbreaker 1/32 by ⅛-in. wide. Job is run with 0.020-in. feed, 100 sfm at ¼-in. (one side) depth of cut in approximately 35 minutes machining time.

Production results attained through use of boring heads equipped with tungsten carbide inserts have been impressive. The use of carbide wear heads on the outside of the boring heads have helped assure a true bore during cutting.

Bores stainless tubing . . .



End view of boring head . . .

Just a "Twist of the Wrist" does it!
. . . The Lehmann
HYDRATROL LATHE
gives 16 Spindle Speed changes with Automatic Slide Rule Selection.

Just a turn of the hand wheel on the front of the headstock of the LEHMANN Hydratrol Lathe gives you a speed change! An automatic slide rule, co-ordinated with the movement of the handle, shows spindle revolutions per minute and indicates a slide rule calculation of the cutting speeds in feet per minute.

Calculation by the operator is unnecessary. The rotary handle provides all speed changes for 16 forward and 8 reverse speeds. No need for intermediate stop; unnecessary to disengage the friction driving clutch to change speed.

Check These Other Important Advantages:

- Safe in operation.
- Simplicity in construction and operation.
- Hydraulic friction clutches and hydraulic brakes, self-compensating.
- Automatic safety relay, for harmless and easy engagement of positive clutches when speeds are changed.
- Spindle release for chucking.
- Perfect, safety-control lubrication with filtered oil.
- Gears constantly in mesh.

Write today for additional information or catalog — or — send prints for time-and-money-saving recommendation!

LEHMANN MACHINE COMPANY GRAND AT CHOUTEAU • ST. LOUIS 3, MO.
DIVISION OF NOVO ENGINE CO.

Magnesium:

Dow plans variety of coiled sheet products with new mill.

Among the more interesting new metal-rolling mills now being installed is one to roll, not steel, but magnesium. It is being erected by Dow Chemical Co. at Madison, Ill., and is expected to be turning out a wide variety of magnesium coiled-sheet products varying from structural shapes to thin strips by early 1954.

The plant will include a reversing mill to reduce one-ton magnesium ingots to strip and three mills for producing various coiled magnesium products. The fact that magnesium is the lightest of structural metals does not mean that the power required for rolling it is small.

The four mills will require a total of 14,000 hp in Westinghouse drives.

The Iron Age
FOUNDED 1855
Markets and Prices

THE IRON AGE SUMMARY...

- First quarter business disappointing so far
- Buying upturn smaller than had been expected
- But overall business still at a good level

First quarter steel business has been disappointing. Even the optimists admit that the upturn in buying so far hasn't been as sharp as many in the industry expected. But business is still at a good level; new orders have been coming in a little faster. And some of the items that were first to weaken last summer now look slightly stronger.

The next few weeks should tell the story. Orders being placed now are mostly for delivery in late February or early March. And March is usually about the best if not the best month in the first half of the year. Indications so far point to a satisfactory but not a big March. It will take a spurt of orders within the next few weeks to raise operations during March much over 80 pct of rated capacity.

Among the disappointments so far have been railroad and auto industry buying. Big things were expected of both. But after a fast start railroad buying slowed to a snail's pace. And railroad purchasing agents are now very cautious. There is no inclination to make heavy commitments.

Among the auto companies only the two biggest producers have been placing orders anything like steel people had expected. Most of the other firms have been (1) setting a moderate production pace and (2) living largely off inventories. Result: auto buying has been much slower than steel people had been led to expect.

On the brighter side, demand for stainless steel is showing marked improvement. Tool steel has also taken a turn for the better. Most grades of electrical sheets are going well, too. Oil country goods and structurals, of course, remain the hottest tonnage items in the market. Demand for cold-rolled sheets is good, but the competition is all among the sellers.

In the Detroit area, the smaller consumer is becoming a more vigorous factor in the market—probably because he has more optimism on business prospects and is finally bringing inventories under control. Although the auto sales picture still must clarify, auto output is running above '53 rates. But from time to time, Chrysler and independents have held up steel shipments.

Almost every Detroit steelmaker reports first quarter books pretty well filled. Second quarter interest and inquiries seem to assure a good first half. Yet, no steel product can now be called even reasonably tight.

From the Midwest come encouraging reports that merchant product demand has been rising—but first quarter bookings may run 25 pct under last year. Total mill bookings continue to move slowly. Across the product front there is slackness. Bars continue to seek customers and the same is true for alloy and stainless.

Sheffield Steel Corp. has cut prices on hot-rolled carbon steel bars and reinforcing bars from $4.65 to $4.55 per 100 lb at its Houston, Tex., mill. The reduction amounts to $2 per ton. National Tube Div., U. S. Steel, has established prices for buttweld pipe at Fairless Works. They are competitive with Bethlehem Sparrows Point prices.

Steel Output, Operating Rates

	This Week†	Last Week	Month Ago	Year Ago
Net Tons Produced (000 omitted)	**1,772**	**1,772**	**1,444**	**2,248**
Ingot Production Index (1947—49=100)	**110.3**	**110.3**	**89.9**	**139.9**
District Operating Rates				
Pittsburgh	88.0	88.0*	76.0	105.0
Chicago	78.0	77.5	74.0	102.5
Philadelphia	78.0	80.0	72.0	96.0
Valley	72.0	73.0*	48.0	101.0
West	80.3	74.0*	74.0	106.0
Cleveland	83.0	83.0*	45.5	93.5
Buffalo	63.5	63.5	52.0	94.0
Detroit	89.0	85.0	62.0	106.0
Birmingham	87.0	95.0	80.5	96.0
Wheeling	85.0	85.0*	76.0	102.0
S. Ohio River	78.5	84.5	80.5	93.0
St. Louis	65.0	64.0	64.0	100.0
East	63.0	77.0*	67.0	101.5
Aggregate	**74.5**	**75.0**	**65.0**	**99.5**

Per cent of capacity for weeks in 1954 is based on annual capacity of 124,330,410 net tons as of Jan. 1, 1954. Per cent of capacity for last year is based on annual capacity of 117,547,470 tons as of Jan. 1, 1953.

* Revised.
† Tentative.

Coming events...!

One way or another, something's going to happen to that barefooted adventurer, above. And business is coming to a turn in the road, too. When all restraints are off and materials are in easy supply, you're sure to find competition much keener and customers a lot more choosey. ● That's when you'll bless the competitive edge that stainless steel can give you—and now's the time to work on it. "*Looks better*"... "*Stronger*"..."*Lighter*"..."*Can't corrode*"..."*Lasts a lifetime*"..."*Keeps cleaner*"..."*Saves on upkeep*"...any one or all of these sales advantages can be yours with Allegheny Metal. Let us help you get them. ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.***

You can make it **BETTER** with

Allegheny Metal

AL® TIME-TESTED STAINLESS STEEL

Warehouse stocks carried by all Ryerson plants

WAD 4818 9

Markets at a Glance

Extra Changes . . . U. S. Steel Corp. has made additional changes in hot-rolled bar extras. Coil pickling extra, formerly a variable ranging from .6¢ to 1.05¢ per lb, is now covered by a single extra of .35¢ per lb. Scrapless nut quality was increased from .1¢ to 1.10¢ per lb. Cold-punched nut stock, formerly sold as special bar quality with an extra of .35¢ per lb, is now cold-punched nut quality carrying an extra of .50¢ per lb.

More Aluminum Uses . . . Already the biggest civilian user of aluminum, the construction industry is going heavily for aluminum-faced structures. Aluminum Co. of America president I. W. Wilson says there are now more than 70 major projects up, going up, or on drawing boards that will have aluminum facing. Porcelain enameled aluminum is also finding interest among architects who'd like to see permanent outdoor colors for the light metal.

Instrument Sales Up . . . Industry's increasing interest in quality control and research is indicated in the 9 pct rise in laboratory equipment sales during the first 11 months of 1953 as compared with the same period last year. Laboratory apparatus showed a 7.4 pct gain over the previous year, but electronic instruments dipped 15 pct due to a drop in defense needs.

Canadian Price Changes . . . Canadian steel producers have made minor reductions on base prices and have adjusted extras. While some steel items show an overall decline consumers will have to pay more on some other items. New tinplate base prices for the first quarter f.o.b. Hamilton mill, per 100 lb box, are: Common coke, $9.70; No. 25 electrolytic, $8.20; tin mill black plate, $7.40. Steel Co. of Canada, Ltd., has revised its base price on carbon bars to $4.73 per 100 lb, Toronto, and has marked plate down to $4.60; nails to $6.35 per 100 lb keg.

Appliance Sales Jump . . . Philco Corp. predicts its major appliance sales will increase by $35 million during 1954. Company expects a 50 pct jump in sales of single-room air conditioners.

Venezuelan Ore Arrives . . . The freighter *Tosca* arrived at U. S. Steel's Fairless Works early this week with the first cargo of Venezuelan ore from U. S. Steel's Orinoco Mining Co. development. Shipments are expected to total 3 million tons this year and reach the annual rate of 5 million tons by 1955.

New Building Blocks . . . Producers of construction materials are studying two new types building bricks. One is a lightweight, bloated-clay-aggregate building block that can be drilled, nailed or sawed. Using common clay as a binder for the first time, the new block is claimed to have superior sound and heat insulating qualities, greater structural strength and a fluxed ceramic binder that is unaffected by heat, frost, vibration. Another building block composed of 50 pct native clay and 50 pct pulverized slag is also creating excitement. If it can be produced commercially, the new brick might become a low-cost brick for refacing old buildings.

Plastics Continue Rise . . . An all-time high of approximately 1.5 million tons of plastic raw materials were produced last year. This is approximately 30 pct more than was turned out in 1952, estimates Society of the Plastics Industry. Output this year is expected to be about 5 pct more than in 1953.

Add Tinning Line . . . U. S. Steel's Tennessee Coal & Iron Div. has started installation of a third electrolytic tinning line at its Fairfield, Ala., tin mill.

Less Steel . . . Granite City Steel Co. has closed down one of its two blast furnaces for relining and has suspended operations in two of its large openhearth furnaces in its No. 1 shop. Company has cut its payroll from 4700 to 4200.

Prices at a Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite prices				
Finished Steel, base	4.634	4.634	4.634	4.376
Pig Iron (gross ton)	$56.59	$56.59	$56.59	$55.26
Scrap, No. 1 hvy. (Gross ton)	$28.50	$28.83	$30.00	$42.00
Nonferrous metals				
Aluminum, ingot	21.50	21.50	21.50	20.50
Copper, electrolytic	29.75	29.75	29.75	24.50
Lead, St. Louis	12.80	13.30	13.30	13.80
Magnesium, ingot	27.75	27.75	27.00	24.50
Nickel, electrolytic	63.08	63.08	63.08	63.08
Tin, Straits, N. Y.	84.50	84.50	84.25	$1.21½
Zinc, E. St. Louis	9.50	10.00	10.00	12.50

Metal Prices Sag in London, U. S.

Copper, lead, zinc all declined in London trading last week . . . New levels lower than U. S. equivalent result in ½¢ price cuts here for lead, zinc—By *R. L. Hatschek.*

Action on the London Metals Exchange last week may presage market events coming soon on this side of the Atlantic. Copper dropped the equivalent of ¾¢ to 1¢ per lb on Friday. Figuring out equivalents puts the closing asked price at a shade over 29¢ per lb on a delivered Connecticut Valley basis.

Immediate result of the London action was a reduction of custom smelter buying prices for copper scrap here. Quotations now stand at 23¢ for No. 1 heavy copper and wire, 21½¢ for No. 2 copper and 20¢ for light copper. Since there is still export demand for copper scrap at slightly higher prices, there was doubt in some circles that refiners will be able to make the new prices stick.

Lead, Zinc Slip . . . Other declining prices in London last week were lead and zinc. The New York equivalent of the London prompt price on Friday was only approximately 12.72¢—about ¾¢ lower than the prevailing U. S. price. Result was a ½¢ cut in U. S. lead prices.

While zinc also declined in London, it had not slipped as much below the U. S. price as of Friday. New York equivalent was about 10.25¢ per lb, about ¼¢ below the current quotation. But it was enough to force a ½¢ reduction in this metal too.

Stocks Climb . . . Copper prices on the commodity market also reflected the decline in London but so far there has been no action by either mine producers or custom smelters and the market continues at 29.50¢ to 30.00¢ per lb. But many people feel that a reduction should be near at hand.

Refined copper production during December increased both in the U. S. and outside the U. S., reports the Copper Institute. And while U. S. stocks of refined copper dipped 4081 tons to 89.193 tons, stocks held by foreign producers went up 19,434 tons to a total of 280,530 tons.

Hard Sell . . . Chile is still finding it difficult to sell copper even after reducing its prices to world levels. Now it's reported that the Minister of Mines has proposed that "sales made to the United States be proportionately distributed between both companies in accordance with their production in plants in Chile and plants in North America. The same proportions were proposed for sales of copper to Europe."

This would be 25 pct Chilean and 75 pct North American and would permit the disposal of larger tonnages of Chilean metal.

Aluminum Output Off . . . November statistics of the Aluminum Assn. indicate production for the month totaling 105,637 tons. This is 2682 tons less than October but the difference is accounted for by the fewer days in November, not to any further power cuts or reduced demand.

What does reflect the reduced demand is the fact that shipments of aluminum products were in smaller tonnages.

Arizona Mining Record . . . Nonferrous mining in Arizona reached a new high of $240 million in 1953, according to Arizona Dept. of Mineral Resources. Copper accounted for more than 90 pct of the dollar production, and topped by $23 million the previous high copper year.

Price drops in both zinc and lead plus a drop in production of more than 50 pct from 1952 figures resulted in the lowest dollar production in those metals since 1943.

Gold and silver prices have remained pegged. Production of silver during 1953 was approximately $300,000 lower, while gold mining was virtually unchanged.

ALUMINUM SHIPMENTS

(net tons)

	Nov.	Oct.
Sheet & Plate, tool	39,253	50,166
Non-Heat-Treatable	27,523	37,256
Heat Treatable	11,729	12,910
Foil	4,743	5,010
Extruded Products, total	10,360	12,797
Soft Alloys	7,852	9,729
Hard Alloys	2,508	3,068
Castings, total	11,232	12,096
Sand	1,418	1,447
Permanent Mold	4,612	5,003
Die	5,202	5,641
Tube, Drawn & Welded, Total	2,067	2,712
Soft Alloys	1,552	2,136
Hard Alloys	510	576
Rod & Bar, Rolled & Drawn	5,652	7,954
Wire, Bare, Not Conductor	1,383	1,685
Electric Conductor (Aluminum Content)	2,472	2,424
Forgings	2,083	2,904

NONFERROUS METAL PRICES

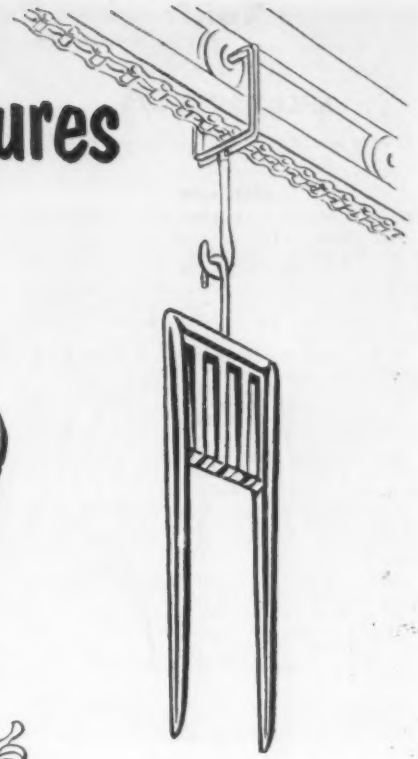
(Cents per lb except as noted)

	Jan. 13	Jan. 14	Jan. 15	Jan. 16	Jan. 18	Jan. 19
Copper, electro, Conn.	29.50–30.00	29.50–30.00	29.50–30.00	29.50–30.00	29.50–30.00	29.50–30.00
Copper, Lake delivered	30.00	30.00	30.00	30.00	30.00	30.00
Tin, Straits, New York	84.50	85.00	85.25	....	84.50	84.50*
Zinc, East St. Louis	10.00	10.00	10.00	10.00	9.50	9.50
Lead, St. Louis	13.30	13.30	13.30	13.30	12.80	12.80

Note: Quotations are going prices
*Tentative

MR. COST CUTTER SHOWS HOW

undivided responsibility assures more profitable plating



For the first time it has become possible to reap all the benefits of a *unified* copper-nickel-chromium plating operation – where all these processes are provided by *one source.*

To the Unichrome Copper and Unichrome SRHS Chromium plating processes has now been added the Unichrome Bright Nickel process. It is being made widely available after 3 years of successful cost-cutting commercial operations during the control period.

Now there can be undivided responsibility for the smooth, efficient working of the whole plating setup. No longer need there be any conflict or confusion when problems arise. One call, to one company brings prompt technical help. Downtime drops, needless expense is avoided, rejects are minimized.

Most important of all – all three processes have features that offer new opportunities for improving plating output, cutting production costs! For example:

NOW IT

1. **HAS BETTER COPPER-NICKEL-CHROMIUM FINISH**
2. **IS PLATED WITH LESS TROUBLE**
3. **SAVES ON FINISHING COSTS**

MORE WAYS UNITED CHROMIUM HELPS TO SAVE ON COATING OF METALS

Reduces waste disposal expense

Containing no cyanide, the Unichrome Pyrophosphate Copper bath saves the cost of materials to treat this poisonous waste, the large initial investment for the treating equipment, the costs for the space it occupies, the labor to operate it, and the subsequent maintenance.

Saves money—jumps output

A plant installed the Unichrome Bright Nickel plating process alongside a larger tank of another type of nickel solution. Both plated identical parts. Yet Unichrome Nickel turned out more work. Reason? It tolerated impurities so much better it took less time out for purification. Now it occupies the larger tank.

More work with less power

In finishing auto bumpers, one plant could plate only 6 pieces per rack when using the ordinary chromium bath. Requiring less current, Unichrome SRHS Chromium permitted plating 8 bumpers per rack – a 33⅓% increase in production without the expense of extra equipment.

TO FINISH IT BETTER AND SAVE

call in "The Unichrome Man"

UNICHROME
Trade Mark.

It pays to consult United Chromium on Metal Finishing Problems

United Chromium offers you the advantages of: (1) 25 years of specialized experience in metal finishing; (2) Wide experience in *both* organic and plated finishes; (3) A diversified line of products for decorative and functional finishing – including plating processes, protective coatings, chemical conversion coatings for zinc; (4) Thinking geared to *cost-cutting, product-improving* possibilities.

We'd welcome an opportunity to help you "Finish it better AND SAVE."

UNITED CHROMIUM, INCORPORATED 100 East 42nd St., New York 17, N. Y.

Waterbury 20, Conn. • Detroit 20, Mich. • Chicago 4, Ill. • Los Angeles 13, Calif. In Canada: United Chromium Limited, Toronto, Ont.

Nonferrous Prices

(Effective Jan. 19, 1954)

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 30,000 lb, f.o.b. ship. pt. frt. allowed)

Flat Sheet: 0.136 in. and thicker, 2S, 3S, 33.9¢; 4S, 36.0¢; 52S, 38.2¢; 24S-O, 24S-OAL, 37.0¢; 75S-O, 75S-OAL, 44.7¢; 0.081-in., 2S, 3S, 35.1¢; 4S, 37.7¢; 52S, 39.9¢; 24S-O, 24S-OAL, 38.4¢; 75S-O, 75S-OAL, 46.9¢. 0.032-in., 2S, 3S, 37.0¢; 4S, 41.8¢; 24S-O, 24S-OAL, 46.9¢; 75S-O, 75S-OAL, 58.4¢.

Plate, ¼-in. and Heavier: 2S-F, 3S-F, 32.4¢; 4S-F, 34.5¢; 52S-F, 36.2¢; 61S-O, 35.6¢; 24S-O, 24S-OAL, 36.9¢; 75S-O, 75S-OAL, 44.3¢.

Extruded Solid Shapes: Shape factors 1 to 5, 37.4¢ to 82.8¢; 12 to 14, 38.2¢ to 99.0¢; 24 to 26, 40.9¢ to $1.29; 36 to 38, 48.4¢ to $1.89.

Rod, Rolled: 1.064 to 4.5-in., 2S-F, 3S-F, 43.8¢ to 87.2¢; cold-finished, 0.375 to 3.499-in., 2S-F, 3S-F, 47.6¢ to 89.3¢.

Screw Machine Stock: Rounds, 11S-T3, ½ to 11/32-in., 59.6¢ to 47.0¢; ⅝ to 1½-in., 46.6¢ to 43.8¢; 1 9/16 to 3-in., 42.7¢ to 39.9¢. Base 5000 lb.

Drawn Wire: Coiled 0.051 to 0.374-in., 2S, 44.1¢ to 32.4¢; 52S, 53.4¢ to 39.1¢; 17S-T4, 60.1¢ to 41.8¢; 61S-T4, 53.9¢ to 41.3¢.

Extruded Tubing: Rounds, 63S-T5, OD 1¼ to 2-in., 31.6¢ to 60.7¢; 2 to 4 in., 37.7¢ to 51.1¢; 4 to 6 in., 38.2¢ to 46.6¢; 6 to 9 in., 38.7¢ to 48.8¢.

Roofing Sheet: Flat, per sheet, 0.032-in., 42¾ x 60 in., $2.838; x 96 in., $4.543; x 120 in., $5.680; x 144 in., $6.816. Coiled sheet, per lb, 0.019 in. x 28 in.

Magnesium

(F.o.b. mill, freight allowed)

Sheet and plate: FS1-O¼ in., 66¢; 3/16 in., 68¢; ½ in., 70¢; B & S Gage 10, 71¢; 12, 75¢. Specifications grade higher. Base: 30,000 lb.

Extruded Round Rod: M, diam ¼ to 0.311 in., 77¢; ½ to ¾ in., 60.5¢; 1¼ to 1.749 in., 56¢; 2½ to 5 in., 51.5¢. Other alloys higher. Base up to ¾ in. diam, 10,000 lb; ¾ to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes: Rectangles: M. In weight per ft, for perimeters less than size indicated: 0.10 to 0.11 lb, 3.5 in., 65.3¢; 0.22 to 0.25 lb, 5.9 in., 62.3¢; 0.50 to 0.59 lb, 8.6 in., 59.7¢; 1.8 to 2.59 lb, 19.5 in., 56.8¢; 4 to 6 lb, 28 in., 52¢. Other alloys higher. Base, in weight per ft of shape: Up to ½ lb, 10,000 lb; ½ to 1.80 lb, 20,000 lb; 1.80 lb and heavier, 30,000 lb.

Extruded Round Tubing: M, 0.049 to 0.057 in. wall thickness: OD, ¼ to 5/16 in., $1.43; 5/16 to ⅝ in., $1.29; ½ to ⅝ in., 96¢; 1 to 2 in., 79¢; 0.165 to 0.219 in. wall; OD, ⅝ to ¾ in., 64¢; 1 to 2 in., 60¢; 3 to 4 in., 59¢. Other alloys higher. Base, OD: Up to 1½ in., 10,000 lb; 1½ to 3 in., 20,000 lb; over 3 in., 30,000 lb.

Titanium

(100,000 lb base, f.o.b. mill)

Commercially pure and alloy grades; Sheets and strip, HR or CR, $15; Plate, HR, $12; Wire, rolled and/or drawn, $10; Bar, HR or forged, $6; Forgings, $6.

Nickel, Monel, Inconel

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	86½	67½	92½
Strip, CR	92½	70½	98½
Rod, bar	82½	65½	88½
Angles, HR	82½	65½	88½
Plate, HR	84½	66½	90½
Seamless Tube	115½	100½	137½
Shot, blocks	....	60	....

Copper, Brass, Bronze

(Freight included on 500 lb)

	Sheet	Rods	Extruded Shapes
Copper	46.41	....	48.48
Copper, h-r	48.38	44.73	....
Copper, drawn	....	45.98	....
Low brass	44.47	44.41	....
Yellow brass	41.72	41.66	....
Red brass	45.44	45.38	....
Naval brass	45.76	40.07	41.33
Leaded brass	....	....	39.11
Com. bronze	46.95	46.89	....
Mang. bronze	49.48	43.62	45.18
Phos. bronze	66.58	67.08	..
Muntz metal	43.96	39.77	41.02
Ni silver, 10 pct	55.36	....	62.63

PRIMARY METALS

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb, freight allowed	21.50
Aluminum pig	20.00
Antimony, American, Laredo, Tex.	38.50
Beryllium copper, per lb conta'd Be	$40.00
Beryllium aluminum 5% Be, Dollars per lb contained Be	$72.75
Bismuth, ton lots	$2.25
Cadmium, del'd	$2.00
Cobalt, 97-99% (per lb)	$2.60 to $2.67
Copper, electro, Conn. Valley	29.50 to 30.00
Copper, Lake, delivered	30.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$165 to $175
Lead, St. Louis	12.80
Lead, New York	13.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb., pig	27.00
Ingot	27.75
Magnesium, sticks, 100 to 500 lb.	46.00 to 48.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$187 to $190
Nickel electro, f.o.b. N. Y. warehouse	63.08
Nickel oxide sinter, at Copper Creek, Ont., contained nickel	56.25
Palladium, dollars per troy oz.	$22 to $24
Platinum, dollars per troy oz.	$90 to $92
Silver, New York, cents per oz.	85.25
Tin, New York	84.50
Titanium, sponge	$5.00
Zinc, East St. Louis	9.50
Zinc, New York	10.00
Zirconium copper, 50 pct	$6.20

REMELTED METALS

Brass Ingot

(Cents per lb delivered carloads)

85-5-5-5 ingot	
No. 115	24.50
No. 120	23.75
No. 123	23.25
80-10-10 ingot	
No. 305	28.75
No. 315	26.50
88-10-2 ingot	
No. 210	37.50
No. 215	34.00
No. 245	29.50
Yellow ingot	
No. 405	20.75
Manganese bronze	
No. 421	25.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper, max.	22.50-23.00
0.60 copper, max.	22.00-22.75
Piston alloys (No. 122 type)	19.75-21.00
No. 12 alum. (No. 2 grade)	19.00-19.50
108 alloy	20.00-20.50
195 alloy	21.00-21.50
13 alloy (0.60 copper max.)	22.00-22.75
ASX-679	20.00-20.50

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—96-97½%	20.00-21.00
Grade 2—92-95%	19.25-20.00
Grade 3—90-92%	18.25-19.00
Grade 4—85-90%	16.75-17.50

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, freight allowed, 5000 lb lots)

Copper	
Cast, oval, 15 in. or longer	44.54
Electrodeposited	38.38
Flat rolled	47.14
Brass, 80-20	
Cast, oval, 15 in. or longer	43.515
Zinc, flat cast	20.25
Ball, anodes	18.50
Nickel, 99 pct plus	
Cast	84.00
Cadmium	$2.15
Silver 999 fine, rolled, 100 oz. lots, per troy oz, f.o.b. Bridgeport, Conn.	94⅛

Chemicals

(Cents per lb, f.o.b. shipping points)

Copper cyanide, 100 lb drum	63.90
Copper sulfate, 99.5 crystals, bbl.	12.85
Nickel salts, single or double, 4-100 lb bags, frt. allowed	30.00
Nickel chloride, 375 lb drum	38.00
Silver cyanide, 100 oz. lots, per oz.	75½
Sodium cyanide, 96 pct domestic 200 lb drums	19.25
Zinc cyanide, 100 lb drum	54.30

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	26	25¼
Yellow brass	19¾	18
Red brass	23	23¼
Comm. bronze	23⅞	23½
Mang. bronze	18¼	17⅞
Yellow brass rod ends	19½	....

Custom Smelters' Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	23
No. 2 copper wire	21½
Light copper	20
*Refinery brass	18½—19

*Dry copper content.

Ingot Makers' Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	23 —24
No. 2 copper wire	21½—22
Light copper	20 —20½
No. 1 composition	18
No. 1 comp. turnings	17½
Rolled brass	14½
Brass pipe	15
Radiators	13½
Aluminum	
Mixed old cast	10 —10½
Mixed new clips	11⅝—12⅛
Mixed turnings, dry	10⅝—11¼
Pots and pans	10 —11¼

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire	21½—22½
No. 2 heavy copper and wire	19½—20½
Light copper	17½—18½
New type shell cuttings	17½—18½
Auto radiators (unsweated)	11 —11½
No. 1 composition	15½—16
No. 1 composition turnings	15 —15½
Unlined red car boxes	13 —13½
Cocks and faucets	13 —13½
Mixed heavy yellow brass	9½—10
Old rolled brass	12½—13
Brass pipe	14½—15
New soft brass clippings	15½—16
Brass rod ends	13 —13½
No. 1 brass rod turnings	10½—11

Aluminum

Alum. pistons and struts	5 — 6
Aluminum crankcases	8 — 9
2S aluminum clippings	11 —11½
Old sheet and utensils	8 — 9
Borings and turnings	5 — 6
Misc. cast aluminum	8 — 9
Dural clips (24S)	9 —10

Zinc

New zinc clippings	4½
Old zinc	3¼
Zinc routings	1¾
Old die cast scrap	3

Nickel and Monel

Pure nickel clippings	60 —65
Clean nickel turnings	48
Nickel anodes	60 —65
Nickel rod ends	60 —65
New Monel clippings	23 —24
Clean Monel turnings	14 —15
Old sheet Monel	20 —21
Nickel silver clippings, mixed	14
Nickel silver turnings, mixed	12

Lead

Soft, scrap, lead	9½— 9¾
Battery plates (dry)	5¼— 5½
Batteries, acid free	3¼

Magnesium

Segregated solids	20 —21
Castings	19 —20

Miscellaneous

Block tin	65 —67
No. 1 pewter	40 —42
No. 1 auto babbitt	37 —38
Mixed common babbitt	11 —12
Solder joints	14
Siphon tops	35
Small foundry type	14½
Monotype	13
Lino. and stereotype	12
Electrotype	10½
Hand picked type shells	7½
Lino. and stereo. dross	4½
Electro dross	2

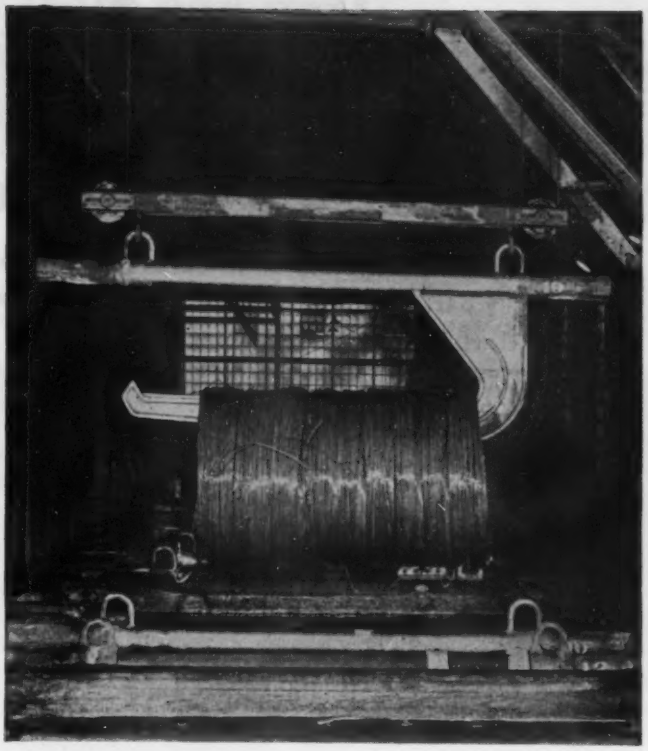
How

"Failed in 6 months"

was changed to

"Excellent condition after 5 years!"

...in one of the Nation's leading wire mills



This Weldco hook of Monel, emerging from a 12% sulphuric acid solution, is carrying a 5,000 lb. load of wire. It is one of many Monel hooks at the John A. Roebling's Sons Corp. The first hooks installed have already given over 5 years of service life. Other materials failed in as little as 6 months.

Back in 1948, some of the pickling hooks at John A Roebling's Sons Corp. of Trenton, N. J., were giving a service life of only six months.

This, the engineers decided, was entirely too short.

They had heard excellent reports about Weldco hooks of Monel, manufactured by the Youngstown Welding and Engineering Company—reports that told of Monel hooks still in service after ten years.

So they began replacing their hooks with corrosion-resisting Monel.

The conditions were severe. The hooks had to go through a 12% sulphuric acid solution at a temperature of 170° to 180°F. carrying a load of 4200 to 5000 lbs. of coiled wire. Each hook had to handle about 60 tons of wire a day.

Six months passed — a year — five years — the first hooks were still in service. What's more they showed practically no signs of corrosion. But the spreader beams to which the hooks were welded had started to corrode from the fumes. Since the hooks were still in excellent condition they were returned to Youngstown for new spreader beams — this time of Monel pipe. They are now back at work giving the same dependable service.

Here's why Youngstown Welding and Engineering Company use Monel for their Weldco hooks:

- Long life because of Monel's resistance to corrosion from sulphuric acid solutions and fumes.
- Light weight for easy handling because of Monel's strength.
- Ready maintenance because of the fabricated construction and Monel's weldability.
- No breakage because of Monel's ductility.
- Extra heavy loads because of Monel's strength.

Tough corrosion-resisting Monel equipment can help increase the efficiency of your own pickling room. Monel crates, racks, chains, hooks, and accessories are used by many of the nation's leading plants to give increased payloads and longer service life. For more information on how Monel can help you, write for "Where Monel Pays Its Way in Pickling."

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

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MONEL® • "R"® MONEL • "K"® MONEL
"KR"® MONEL • "S"® MONEL • INCONEL® • INCONEL "X"®
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LOW CARBON NICKEL • DURANICKEL®

INCO

Monel ... *for minimum maintenance*

Scrap Orders Few and Far Between

Market continues static . . . Mills in most areas almost completely out of market . . . Iron Age Composite dips to $28.50 . . . Cast generally stays respectable . . . Rail grades off.

Scrap industry representatives attending the annual convention of the Institute of Scrap Iron & Steel in Washington early this week didn't miss much at home. Across the country the story was virtually the same: Mills were buying little if any scrap, and dealers and brokers were protesting that it would scarcely pay them to fill any orders they might receive at current levels. Reflecting static market conditions, THE IRON AGE Scrap Composite declined another 33¢ to $28.50.

One bright spot in several areas was cast, which continued to move fairly robustly. Going prices were respectable in most districts, but nothing to get excited about. Turnings prices generally maintained their dismal relation to steelmaking grades.

Rumors of exports strengthened on both coasts, with enough definite activity in the West to cause mills there to at least keep a wary eye out. But little concrete had come along in the East.

Pittsburgh—The market continued quiet this week. With steel producers resigned to a dull February and uncertain over March demand, activity is expected to remain at a low level. After taking several furnaces out of production an independent mill is restricting shipments on its recent order of $31 No. 1 heavy melting. Latest railroad lists call for a reduction of 50¢ per ton on No. 1 railroad and specialties, but rails were up $1. Continued weakness in blast furnace dropped short turnings $1 per ton.

Chicago—In a slow market, railroad grades continue to slide downward toward a more normal relation to the rest of the scrap grades. They still had a long way to go, but with railroad scrap going begging in some cases, it began to look as though the return of a normal differential might be in sight. The entire market continued extremely stagnant, and minor sales in turnings served only to peg going prices, caused no upturn in overall demand for that grade. Electric furnace continues in poor shape. Prices continue to be almost nominal with mill buying extremely low during the week.

Philadelphia—Local scrap trade is sinking lower and lower. Prices are largely unchanged in the lack of any decent buying, though the feeling is one of further weakness for steelmaking and blast furnace grades. District mills are reported to hold some of the heaviest tonnages of scrap in recent history.

New York— Only bright spot here is cast, which continues to move at a good clip at respectable if not exciting prices. Steelmaking and turnings grades remain stagnant with little early improvement expected. Rumors of exports persist, but nothing concrete had materialized at press time. It was learned from shipping circles that negotiations for freight were in the talking stage.

Detroit—Some minor buying for local consumption held the price of No. 2 grades firm but the general tone of the market was weaker. Blast furnace grades continued to slump with only a few offers to buy at very low prices. Some resistance to low offers developed, but enough were accepted to bring turnings prices down another $1. In contrast the cast market showed more strength, mostly traceable to automotive foundries and a stepped-up die program.

Cleveland — Small tonnages of blast furnace and cast scrap have moved but market is otherwise static. Major consumers still haven't released shipments. Until they do feeling is that prices will not change appreciably. Some brokers report acceptance of $32 bids on railroad scrap in nearby areas. Others say carriers are withholding for better offers. In some instances remelting of home scrap is keeping consumer inventories high.

Birmingham—A scarcity has developed in No. 2 heavy melting scrap in this area. Orders placed in December for January delivery are being filled slowly. Dealers report suppliers reluctant to gather scrap at prices now being offered. The cast market continues steady. First boatload of scrap steel for foreign ports under the new federal export licensing program is scheduled to leave next week from Jacksonville, Fla.

St. Louis—Because there has been so little buying and mills give no indication of when they will come into the market, scrap is weaker and some prices are lower. Country dealers have little to offer as the present market has caused haulers to slow down collections of material.

Cincinnati—Low phos, 18 in. and under and 18 in. rail crops both dropped $1 to $34 and $44 respectively on basis of limited sales. Other prices remained unchanged in face of very substantial foundry and steel plant inventories.

Buffalo — Dealers sentiment was depressed as decline in scrap prices was extended $2 a ton. Large accumulations of stock were reported in dealers' yards as three leading mill consumers remain out of market.

Boston — Blizzard conditions with zero and below temperatures combined with the cold-shoulder of buyers to freeze the New England market stiff. Scattered small sales of No. 1 heavy maintained the previous quotations but lack of demand for No. 1 bundles pushed that price down to $17 to $18 per ton. Blast furnace grades tumbled and some cast grades slipped further.

West Coast—Major buyers edged back into the market slightly last week with some purchases $3 under previous prices. Some out-of-area distress tonnage was going $6 under the San Francisco price, but quantities were small.